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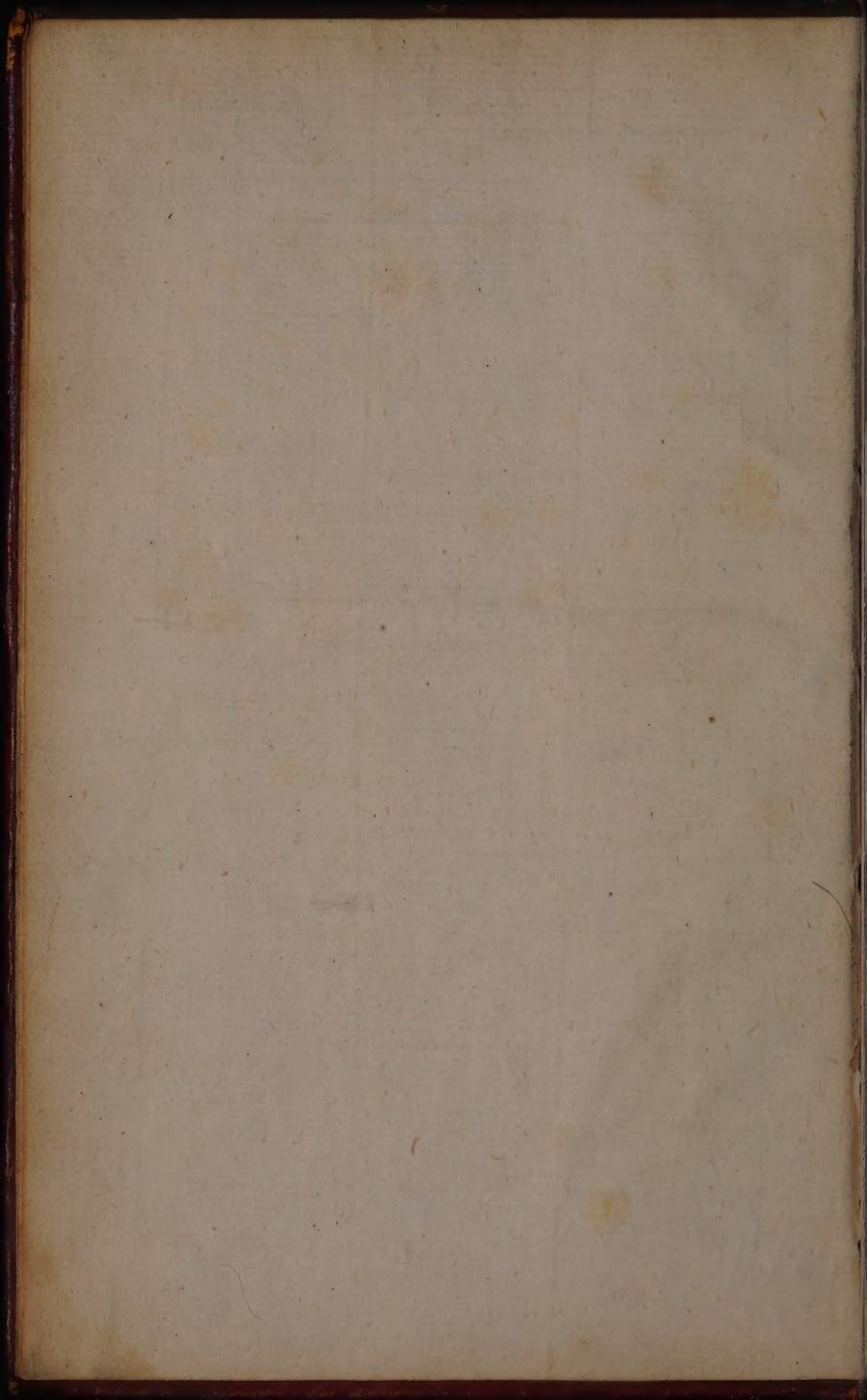
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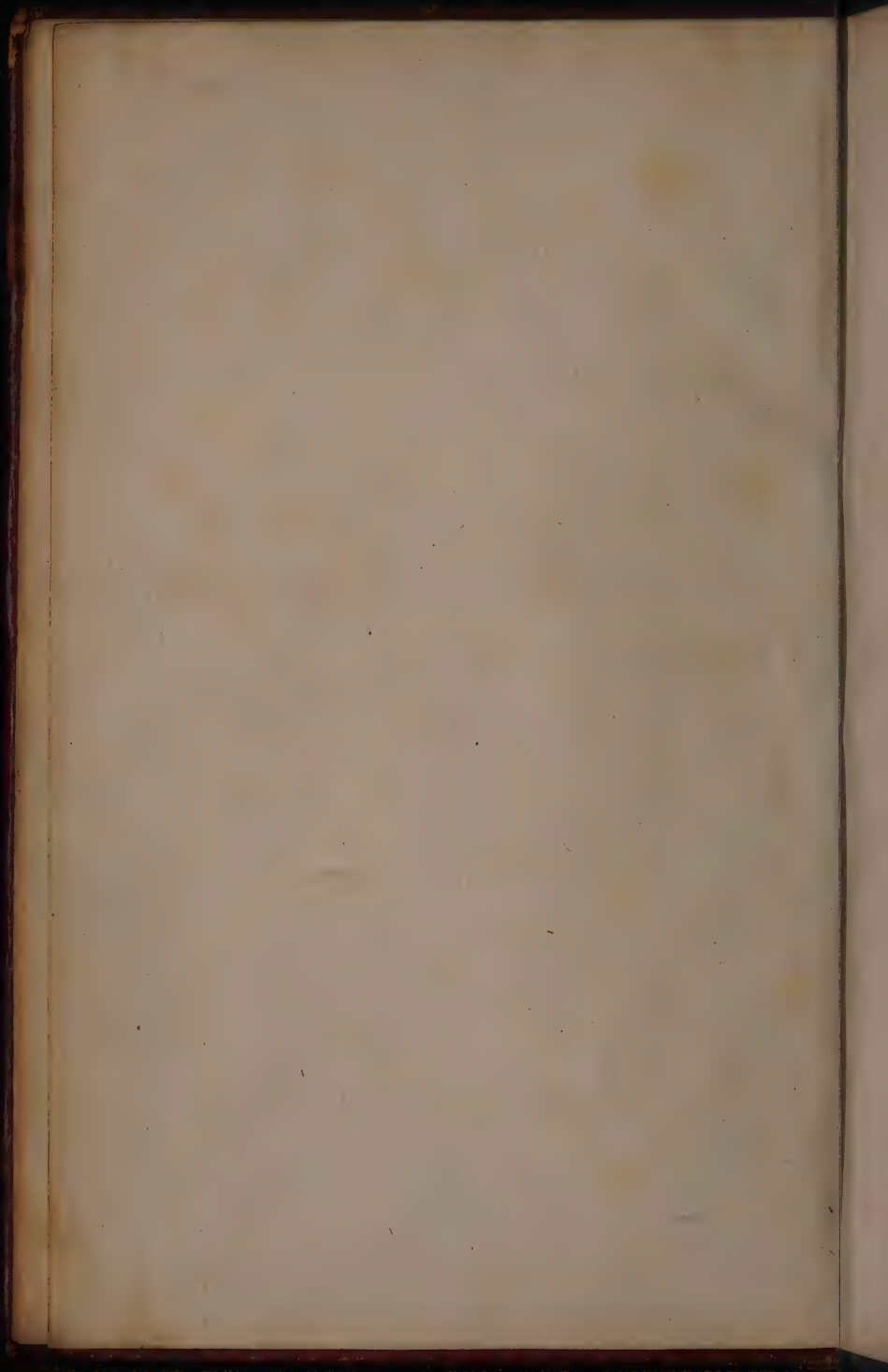
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A
COURSE
OF
Chymistry.

CONTAINING
An easie Method of Preparing
those Chymical Medicins which
are used in *PHYSICK*.

WITH
Curious Remarks and Useful Dis-
courses upon each Preparation, for the
benefit of such who desire to be in-
structed in the Knowledge of this ART.

By *NICHOLAS LEMERY*, M. D.

The Second Edition very much Enlarged.

Translated from the Fifth Edition in the *French*,

By *WALTER HARRIS*, M. D.

Fellow of the College of *Physicians*.

LONDON,

Printed by R. N. for *Walter Kettilby*, at the
Bishop's-Head in *S. Paul's Church-yard*, 1686.

COURSE

Chemistry.

LECTURES
ON THE
ELEMENTS OF

PHYSICAL CHEMISTRY

DELIVERED AT THE
UNIVERSITY OF

WELLS

BY

JOHN

WELLS



TO THE
Most Honourable
THE
LORD MARQUISS
OF
WORCESTER.

MY LORD,

IT may seem very improper to
address a Translation out of
French to Your Lordship, who
have spent so many years to the
greatest advantage in France, and
who is not only a Great Master of
that Gentile Language, but of all
the more eminent modern Lan-
guages of Europe. But those
A. 3 who

The Epistle Dedicatory.

who. have the Honour to know any thing of Your Lordship must needs allow, that no Dedication of what is Useful to the world, or Learned in any kind, can be more properly tendered than to a Person who being born in the Highest Rank of our Nobility, has Power to Patronize whatsoever he takes into his Protection, and who being fully replenished with all the admirable accomplishments, which a mighty Genius, a penetrating and vigorous Understanding, an early and exemplary Virtue and Piety, and all sorts of Foreign and Domestick improvements could bestow; in order to render Your Lordship either a Great Minister in affairs of State,

The Epistle Dedicatory.

a Compleat Courtier, an Eminent Patriot in the time of Peace, a Valiant and Judicious Commander in the time of War, or an excellent Judge both of Men and Books. My Lord, the Treatise I now offer You, is not writ after the usual way of ordinary Chymists; it has none of the bombastick expressions, nor ridiculous pretences, none of the Melancholick Dreams, and wretched Enthusiasms, none of the palpable falsities, and even impossibilities wherewith the common rate of Chymical Books has been stuff'd heretofore. The Author is no Believer in that great and unhappy stumbling-block, the Mystery of Projection, nor at all ad-

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dicted

The Epistle Dedicatory.

dicted to the Transmutation, or rather Adulteration of Metals. He is an excellent Operator, his Reasonings are close and pertinent to the matter in hand, and all deduced from matter of Fact; in-
somuch that I think he may be said to have Purified and Refined Chymistry from the many dregs and feculencies, which by other mens over-refining, and over-curious diligence it had been tainted with before. I shall not trouble Your Lordship too much with things so unsuitable as these are, considering that Your Noble Soul, and Publick Spirit is hourly engaged in serving, and becoming highly useful to your Countrey upon the
great-

The Epistle Dedicatory.

greatest occasions. Your Lordship had a considerable share in the happy conclusion of this Summers Campaign, with Your most Illustrious Father, his Grace my Lord Duke of Beaufort, who did maintain, by his Presence, and Wise Conduct, that great Post of the utmost importance, the City of Bristol, against the power of the Rebels, who confidently gave out that they were sure of Bristol, and doubtless might have been so, unless prevented by the Wisdom and Courage of His Grace, and Your Lordship. These things, My Lord, are but the beginning of what the World is to expect

The Epistle Dedicatory.

expect from You, and may now very reasonably promise it self, under the auspicious Government of our most Potent, and most Invincible Monarch. What great thing may not reasonably be presumed, when the Head and Body are so admirably fitted for the Conquest of the World! and the rather, now the Body is so well Purged from the sowre Leaven of Intestine Rebellion. May Your Lordship long continue to partake of His Majestie's Royal Favour, and to Ennoble the most Illustrious House of the Somersets, with thousands of gallant Actions, worthy Your self, and worthy

The Epistle Dedicatory.

worthy Your high Descent from
some of the Greatest Men in the
World, for many Generations
past. I am,

MY LORD,

Your Lordship's most Humble,

and most Obedient Servant,

WALTER HARRIS.

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WILLIAM L. BROWN

THE
PREFACE:

I Shall easily acknowledge that the world is in no want of Chymical Books; *Germany* alone can sufficiently furnish those who are much inquisitive after them, with as great variety as their heart can wish. And yet in this great plenty, or rather superfluity of Books of Chymistry, when we have weighed things a little maturely, we shall find that something very material is still wanting, in order to render Chymistry of good use to the World; and that is, to give a just and impartial judgment of the benefits and the mischiefs, the safety and the danger of many great and common, but those

The Preface.

those very Active Chymical Medicins, according to the proper use, or irregular application of them, and according to the innocence, or destructiveness of their composition. In order to this end, I do conceive that this Author's plain and natural way of examining every Operation by Reason and Experience together, his singular perspicuity in his Discourses and Remarks, and his universally avoiding all Imaginary Notions in the explication of the accidents and circumstances which do attend the Operation, may be a good foundation upon which some Judicious Practisers may hereafter raise cautions & instructions of excellent use to mankind.

This Author is one of the first through-pac'd Chymists who has had the ingenuity and sagacity to suspect the influence of Fire on the chief Preparations made with it. For
though

The Preface.

though Chymistry has by some been called *Pyrotechnia*, or the ART of FIRE, and Fire has seemed to be as much deified by most Chymists, as *Scaliger* tells us, *Exercit.* 258. it was by the barbarous *Lybians*, who did worship it as a God; yet this worthy man has in many places of his Book abundantly acknowledged, or at least sufficiently hinted at the hurt, as well as the good, which medecins may receive from its violent nature.

He says, p. 21. *If we consider impartially how Fire does act, we shall be forced to acknowledge, that it rather destroys, and confounds the greatest part of the bodies it opens, and does not leave them in the natural state they were in before, and especially when it is driven with that force which is necessary to draw them.*

He proves all Alkali Salts, whether Volatile or Fixt to be changed from their Natural state, by the means of
Fire,

The Preface.

Fire, and also to have received, and to retain the very particles and substance of Fire in its full activity; and shews how the great ebullition which happens upon the mixture of Acid and Alkali is or may be presumed to be wholly or in great part owing to the fire contained in them. The heat, and fume, and ebullition, the noise and detonation, which do attend the making *Spirit of Niter* Dulcified, do shew what a Fire is drawn into the body of that Corrosive Spirit that can make so remarkable a conflict and bustle, that it is even ready to take flame of it self, though the operation or Dulcification be made without coming near the fire, and though there is no appearance of Alkali contending with Acid, to cause the aforesaid tumult, see the Remarks on *Spirit of Niter* Dulcified, p. 302, 303. The same thing happens upon mixing *Oil of Vitriol*,
(ano-

The Preface.

-(another Corrosive Acid) with *Oil of Turpentine*, which is no Alkali; the mixture grows so hot, through the Fire contained in the Acid, *that it sometimes breaks the Viol, and often produces a considerable ebullition*, see p. 342.

He observes, that water thrown upon *Tartar* newly Calcined, does heat and cause ebullition, after the manner as it does with *Quicklime*, the Fire that was entred into it making a violent eruption.

He is the first perhaps who has taken such particular notice, what an augmentation of weight is added to many Preparations by the concurrence and incorporation of the substance of Fire into their composition, as you may see in the Calcination of *Lead*, p. 107. in the Distillation of *Spirit of Saturn* from the *Salt of Saturn*, p. 116. in the Calcination of *Regulus of Antimony*, p. 208. and even

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in

The Preface.

in the Calcination of *Antimony* by the heat of the Sun with a burning-glass, p.228. which few instances may possibly lead the way to Inquisitive persons to discover the same augmentation in divers other Preparations.

His addiction to Chymistry has not heated his head with fond and groundless hopes of attaining Projection, nor led him to abuse the world with Counterfeiting the Nobler Metals, but he has candidly exposed the impostures of *Alchymists* at large, in the Chapter of *Gold*, p.49, &c. I shall say nothing of his description of the *Phosphorus*, and divers other new matters delivered in this Edition. I dare presume the Judicious Reader will not dislike many things in the Book, when he has a little considered them.

Therefore although we may possibly

The Preface.

bly be overstockt with Books that pretend to Chymistry, yet I hope the discerning Reader will think it no dis-service, that I become an instrument of adding one more good Book of this kind to the number of our bad ones: the kind reception which the former Edition met with, when comparatively short and imperfect, has already in some measure bespoke the welcom, which this may reasonably hope for, being revised, and very much enlarged by the ingenious Author, and when compared with the former Edition will be found to bear the proportion of a Man in his full strength and vigor, to that of a growing hopeful Youth.

I will not detain you from the work it self, only would advise young Students, for whose instruction it is principally designed, not to be too bold in the use of such Medicins as

vid a 2 have

The Preface.

have undergone great Fires, nor to be over-credulous in believing the strange wonders, and most mighty Cures which too many other Chymists have extravagantly boasted, and most solemnly, but groundlessly assured us. The wise *Hippocrates* will acquaint them, that Ἡ ἰατρικὴ μάλιστα κατὰ φύσιν ἐστίν. And *Galen* frequently teaches, that Nature is abundantly wiser in her works than Art can be; and that the Works of Nature are far above our greatest praises, and deserve our highest admiration, as may be seen more at large in his 7. and 11. Books of that excellent Tract, *de usu partium*.

A good Physician must have studied *Art* and *Nature* too. And a Chymist of the first rank will find himself never the worse an *Artist*, by his being likewise a skilful *Naturalist*.

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A
COURSE
OF
CHYMISTRY.

Of Chymistry in General.

THE Word *Chymistry* is derived from the Greek word *χυμωσις*, a Juice, or from *χέω*, to melt; because it teaches us to separate the purer Substances of Mixt bodies, which are sometimes called *Juices*; and because it shews us how to melt things that are of the most solid nature. The Chymists have added the Arabian particle *Al*, in the word *Alchymy*, intending to give it a sublime signification, as particularly when the *Transmutation of Metals* is understood by it, though otherwise *Alchymy* signifies no more than *Chymistry*. It is called the *Spagirick Art*, from *σπάω*, and *ἀνίστημι*, to separate, and to gather together, because it teaches how to separate the useful parts of a body from the unuseful, and how to joyn them together again. 'Tis called the *Hermetick Art*, from

B

Hermes,

Hermes, one of the first Inventors of it. Lastly, it has been called *Pyrotechnia*, from *πῦρ*, and *τέχνη*, signifying the *Art of Fire*; for in effect it is by *Fire* that we bring all Chymical Operations to pass. Other names have been given to this Art, but because the knowledge of them is to no great purpose, we will be contented with having related some of the chief.

Chymistry is an Art that teaches how to separate the different substances which are found in Mixt bodies: I mean by a Mixt body those things that naturally grow and increase, such as Minerals, Vegetables, and Animals. Under the name of Minerals, I comprehend the Seven Metals, Minerals, Stones, and Earths; under Vegetables, I understand Plants, Gumms, Rosins, Fruits, the several sorts of *Fungus*, Seeds, Juices, Flowers, Mosses; and whatsoever else comes from them. Among these also I reckon *Manna*, Honey, and those that are called imperfect Mixts. And under Animals I contain both the Animals themselves, and whatsoever belongs to them, as their parts and excrements. But before I begin to speak particularly of all these things, I believe it will be convenient to say something of the *Principles of Chymistry*, and give a general *Idea* of *Furnaces*, *Lutes*, the degrees of *Fire*, and *Terms* that may occasion any obscurity.

Of the Principles of Chymistry.

The First Principle that can be admitted for the composition of Mixts, is an *Universal Spirit*, which
being

being diffused through all the world, produces different things according to the different Matrices, or Pores of the earth in which it settles. But because this Principle is a little *Metaphysical*, and falls not under our senses; it will be fit to establish some sensible ones; wherefore I shall relate those that are commonly held.

Whereas the Chymists in making the *Analysis* of Mixt. bodies have met with five sorts of Substances; they therefore concluded that there were five Principles of Natural things, *Water, Spirit, Oil, Salt, and Earth*. Of these five, three of them are Active, the *Spirit, Oil, and Salt*; and two Passive, *Water and Earth*. They called them active, by reason they do cause all manner of action; and the others passive, because being in repose themselves, they only serve to stop and hinder the quick motion of the actives.

The *Spirit* which is called *Mercury* is the first of the Active principles, that appears to us, when we make the Anatomy of a mixt body. 'Tis a subtile, piercing, light substance, that is more in motion than any of the others. It is this which causes all Bodies to grow in more or less time, according as it abounds in them more or less. But it happens that the Bodies wherein it abounds are more liable to corruption, by reason of its too great motion, and this is observ'd in Animals and Vegetables. On the contrary the greatest part of Minerals, as containing but a very small quantity of it, do seem to be incorruptible. It cannot be drawn pure, no more than the others I am going to speak of. But either it is involv'd in a little *Oil*, that it carries along with it, and then may be

called a Volatile Spirit, such as the Spirit of Wine, of Roses, of Rosemary, of Juniper; or else is detained by some Salts, which check its Volatility, and then may be called a *fixt Spirit*, as the Acid Spirits of Vitriol, Alum, Salt, &c.

The *Oil* which is called *Sulphur* by reason of its inflammability, is a sweet, subtile, unctuous substance, that rises after the *Spirit*. This is said to cause the diversity of Colours and Smells, according to its disposition in Bodies: this gives them their Beauty, and Deformity, uniting together the other *Principles*: this also sweetens the acrimony of *Salts*, and by shutting up the Pores of a mixt, hinders it from corrupting, either through too much moisture or cold. Wherefore many Trees and Plants that have a great deal of *Oil*, are wont to last green much longer than others, and can resist the extremity of ill weathers. It is always drawn impure. For either it is mixt with Spirits, as the *Oils* of Rosemary, of Lavender, which swim above the water; or else it is fill'd with Salts, that it draws along with it in the distillation, as the *Oil* of Box, *Guaiacum*, Cloves, which do precipitate to the bottom of the water by reason of their weight.

Salt is the last of the Active Principles, which remains disguised in the *Earth*, after the other *Principles* are extracted. It is drawn by pouring water upon the earth to imbibe its *Salt*; then filtering the dissolution, and evaporating all the moisture, a *Salt* is found at the bottom of the Vessel. It is a fixt, incombustible substance, that gives Bodies their consistence, and preserves them from corruption. This causes the diversity of tastes, according as it is diversly mixed. There

There are three different *Salts*, as the *Fixt*, *Volatile*, and *Essential*. The *Fixt Salt* is that which remains after Calcination: the *Volatile* is that which easily riseth, as the Salt of Animals: And *Essential Salt* is that which is obtained from the Juyce of Plants by Crystallization. This last is between the *Fixt* and *Volatile*.

Water, which is called *Phlegm*, is the first of the Passive Principles: it comes in distillation before the *Spirits* when they are *fixt*, or after them when they are *volatile*. It is never drawn pure, but always receives some impression from the Active Principles. And this causes it to have a more deterfivive virtue in it than common *Water*. It serves to separate the Active Principles, and to bridle their motion.

The *Earth*, which is called *Caput Mortuum*, or *Terra Damnata*, is the last of the Passive Principles, and can no more be separated pure than the rest, but will still retain some *Spirits* in it; and if after you have depriv'd it of them as much as you are able, you leave it a good while expos'd to the Air, it will recover new *Spirits* again.

Remarks upon the Principles.

The word *Principle* in *Chymistry* must not be understood in too nice a sense: for the substances which are so called, are only *Principles* in respect of us, and as we can advance no farther in the division of bodies; but we well know that they may be still divided into abundance of other parts, which may more justly claim, in propriety of

Speech, the name of *Principles*: wherefore such substances are to be understood by *Chymical Principles*, as are separated and divided, so far as we are capable of doing it by our weak imperfect powers. And because *Chymistry* is an Art that demonstrates what it does, it receives for fundamental only such things as are palpable and demonstrable. It is in truth a great advantage to us, that we have *Principles* so sensible as they are, and whereof we can have so reasonable an assurance. The fond conceits of other *Philosophers*, concerning *Natural Principles*, do only puff up the mind with grand *Idea's*, but they prove or demonstrate nothing. And this is the reason that going to discover their *Principles*, we find some of them do frame one Systeme, and others another. But if we would come as near as may be to the true *Principles* of *Nature*, we cannot take a more certain course than that of *Chymistry*, which will serve us as a Ladder to them; and this division of substances, though it may seem a little gross, will give us a very great *Idea* of *Nature*, and the figure of the first small particles which have entred into the composition of mixt bodies.

Some modern *Philosophers* would perswade us, that it is altogether uncertain, whether the substances which are separated from bodies, and are called *Chymical Principles*, do effectually exist and are naturally residing in the body before: these do tell us that the fire by rarifying the matter in time of distillation is capable of bestowing upon it such an alteration as is quite different from what it had before, and so of forming the *Salt*, *Oil*, and other things which are drawn from it.

This

This objection does at first seem to have much weight and reason in it, because it is certain (as hereafter shall be shewn) that the *Fire* does give a very considerable impression to the preparations, and that very often it does put such a new face upon things, that they are very hardly to be known when compar'd with what they were before. But it is easie to shew, that though the *Fire* does so diversifie and alter substances, yet it does not make those *Principles*; for we see them and smell them in many bodies, before ever we bring them to undergo the *Fire*. For example, it cannot be denied, but that there was existent *Oyl* in *Olives*, in *Almonds*, in *Nuts*, and in many other fruits and seeds, because it is drawn, only by beating and pressing them. *Turpentine*, which is a thickned *Oyl*, and many other fat, or unctuous liquors, are drawn by meer incision into the trunk, or root of trees; and what else I pray is the *fat* of animals but an *Oyl*, or *Sulphur coagulated*? Nor can it be denied, but that there is *salt* actually in mixt bodies, since that by bruising a Plant, and making expression to draw out its juyce, and then leaving the juyce to settle in some cool place for a few daies, a *salt* will be found fixt about the vessel in form of little *Crystals*.

I know that some doubting Scepticks (who make it their business to doubt of every thing) will still say that by beating the Almonds, and then pressing them, and by making incision into Trees, the parts which compose the plant are agitated and put in motion after such a manner as they are by *Fire*, and that this agitation of parts is capable of ranging them so, as to make the *Oyl* and *Salt*.

But such reasonings as these do destroy themselves by too much niceness, and there is no sober understanding man but easily perceives the falshood; for can a man well perceive that meer trituration or incision are able to make *Salt, Oyl, Earth*? it is abundantly more probable, nay, and it may be sufficiently demonstrated, that those substances did exist in the bodies before, and that by incision and trituration the gate has only been opened to let them come freely out.

Others again do attack the *Principles* of Chymistry after another manner a little differing from this, these do acknowledge that the foresaid substances are naturally in the Mixts, much as we draw them by Art, but they assert that we have no proof that the Mixts are *compounded* of these same substances, called *Principles*, and that they are not drawn from the juyce of the earth in such a form; that *Salt, Sulphur, &c.* may indeed have been formed in the natural Fermentations, and other elaborations, which happen in the Mixt during its growth, and therefore they conclude that those substances cannot properly be called *Principles*, because we do not know sufficiently whether the Mixt was *composed* of them at first.

But since we are satisfied that the *earths* which serve for a *matrix* to Mixt bodies, are impregnated with *Salt, Sulphur*, and other substances of the nature of those which we do find in the bodies, and since we can perceive nothing else which can contribute to their composition, it remains beyond all doubt that they are even *compounded* of them.

It must be granted that the *Fermentations*, or other Elaborations which come to pass in mixt bodies,

bodies, have given the *Principles* a certain order of parts, or some dispositions they had not before, but they do by no means *form*, or compose them.

The *five Principles* are easily found in *Animals* and *Vegetables*, but not so easily in *Minerals*. Nay there are some *Minerals*, out of which you cannot possibly draw so much as *two*, nor make any separation at all (as Gold and Silver) whatsoever they talk, who search with so much pains for the *Salts*, *Sulphurs* and *Mercuries* of these metals. I can believe, that all the *Principles* do indeed enter into the composition of these Bodies, but it does not follow that they must remain in their former condition, or can be drawn as they were before; for it may be these substances which are called *Principles* are so strictly involved one within another, as to suffer no separation any other way than by breaking their Figure. Now it is by reason of their *Figure* that they are called *Salts*, *Sulphurs*, and *Spirits*: For example, if you mix an Acid Spirit with the *Salt* of Tartar or some other Alkali, the edges of the Acid will so insinuate into the pores of the *Salt*, that if by distillation you would separate the Acid Spirit again from the *Salt*, you'l never be able to effect it, the *Acid* will have lost almost all its strength, because the edges of these *Spirits* are so far destroyed or changed, that they no longer preserve their former Figure.

Every body knows that *glass* is made of *Salt*, but because the Fire hath wrought so great a change upon its Texture, or Figure, it can do nothing at all that *Salt* is used to do; nay, and it is in a manner impossible to draw any *true Salt* from it by *Chymistry*.
There

There are three sorts of Liquors that are qualified with the name of *Spirit* in Chymistry; the *Spirit of Animals*, the *Burning Spirit of Vegetables*, and the *Acid spirit*.

The first of them, as the spirit of Harts-horn, is nothing but a *Volatile salt* dissolved by a little *Phlegm*, as I shall shew when I treat of Animals. The second, as the Spirit of Wine, the Spirit of Juniper, and the Spirit of Rosemary, is an exalted *Oyl*, as I shall shew speaking of Wines. And the last, as the Spirit of Vinegar, Tartar, and Vitriol, is an *Acid Essential salt*, dissolved and put in fusion by the fire, as I shall prove, when I speak of Vinegar, and the distillation of Tartar: this last is called a *Fluid salt*.

These three sorts of liquors comprehending all that can any way be called *Spirit*, this may pass for one *Principle* very well; for seeing that the *Spirit* which is drawn from Animals is nothing but a *Salt* dissolved by a little *Phlegm*; that Spirit of Wine is only an *Oyl* exalted, and that the *Acid Spirit* is a *Salt* become *fluid*, we can observe nothing in these liquors but an *Oyl*, *Salts* of a different nature, and *water*. Wherefore it must be concluded, that the *Spirit* or *Mercury* which Chymists have talk'd of is a meer *Chimera*, that serves only to confound mens minds, and render Chymistry unintelligible; for men might if they would, have called these liquors by more proper names: thus what hindered them from calling the *Spirit of Animals*, by the name of a *Volatilo salt dissolv'd*? the liquors which come from *Oyls* might have been called an *exalted Oyl*; and the *Acid spirits* a *Fluid salt*; and hereby we should not have

have been troubled about an imaginary *Principle*, and Chymistry would have been better understood.

But it is impossible to change a name that has been so long fixt and appropriated to these liquors. All that I can do is to explicate, as I have done, what is meant by the word *Spirit*; in order to avoid Equivocations.

Nothing but the *Oyl*, can properly be said to be *Inflammable*, and the *Oyl* is so much the more so, as the Salts, with which it is closely united, have been more or less spiritualized. For that which I call *Spirit* in the *Oyl*, is nothing but an Essential or Volatile Salt; this Salt is not of it self *Inflammable*, but serves to Rarifie and Exalt the parts of the *Oyl* to render them the more susceptible of Motion, and consequently of *Flagration*; after the same manner as when *Salt-peter* is put to mix with some Oily substance, this Oily matter fires much more easily than when it is alone; though *Salt-peter* of it self is not at all *Inflammable*, as I shall prove hereafter. We have examples of the truth of what I say in *Spirit of Wine*, *Oyl of Turpentine*, and all other Inflammable Liquors; for they are only *Oyls* subtilized and refined by the Volatile Salts they contain. Vegetables have a great deal of Salt much like to *Salt-peter*; this Salt being straitly united with their *Oyl* makes them the more apt to flame, than if they had been deprived of it. The Fat of Animals as well as their other parts, is full of a Volatile Acid salt; Wax, Rosine, and all other matters that are inflammable, are impregnated with an *Acid Salt*, *Essential* or *Volatile*.

I say the *Salt* which causes the flagration of *Oyls*, must be either *Volatile* or *Essential*, for if it were a *fixt Salt*, 'twould have a contrary effect, it would allay in some measure the quick motion of the parts of an Inflammable body; and this we see happens when *Sea-salt* is flung into the fire, it serves to put it out. *Common Sulphur* yields us another instance of the same kind: consisting of one part Sulphureous or Oily, and another Saline or Acid fixt, which plainly appears in the opening of it, the Oily part fires, and would soon rise like other Oils into a great white flame, but that the Acid part being a load to its activity hinders it from rising, and so forces it to cast but only a small blue flame; and a proof of what I affirm may be had from mixing *Salt-peter* with *Sulphur*; for the *Volatile salt* of *Salt-peter* does *Volatilize* the *Salts* of *Sulphur*, and causes a white flame to burn violently, as I shall shew hereafter in the Operation of *Salt Polychrest*.

Many things are called Oils very improperly, as the Oyl of Tartar made *per Deliquium*, the Oyl of Vitriol, and the Oyl of Antimony. The first is nothing else but a Salt dissolved, the second is the strongest, and most caustick part of the spirit of Vitriol, and the last is a mixture of Acid Spirit, and Antimony.

As for *Salt*, I am apt to think, that there is one chief, of which all the rest are compounded, and do conceive it to be made of an Acid liquor sliding through the veins of the Earth, which doth insensibly insinuate and incorporate in the Pores of stones, which it does dilate and attenuate: afterwards by a long fermentation and concoction of
several

several years, a *Salt* comes to be formed, that is called *Fossile*; and this Opinion is the more likely to be true, because from the mixture of *Acids* with some *Alkali* matter we always draw a substance very like unto *Salt*. Now stones are an *Alkali*. I add, that the long fermentation, and concoction which is made in the stone, serves to digest, and perfectly unite the *Acid* with the stony parts, for the making of *Salt*.

This *Fossile salt*, which is called *Gemma*, by reason of its transparency, is found in many high Mountains of *Europe*, such as those in *Poland*, *Catalonia*, and *Persia*, and in the *Indies*; it is altogether like that we use for nourishment, which is called *Sea salt*, inasmuch that the Waters of the Sea may be said to receive their saltishness from nothing else but this *Salt* dissolved in them.

Is it not likely enough that the bottom of the *Sea*, or its shores, may be much like the surface of the Earth we inhabit, and that there may be Mountains, Rocks, different sorts of earth, and consequently *inexhaustible Mountains of Salt* in a Million of places at the bottom of the Sea, whence it receives its brackishness?

And it may be there are Waters, which after taking Salt from several earths, do at last discharge themselves into the Sea through an infinite number of subterranean channels, which do much contribute likewise to making Sea-water salt.

That which confirms me in this opinion is, because there are *Lakes* in *Italy*, *Germany*, *Egypt*, the *Indies*, and many other places, which are as *Salt* as the *Sea*, and can have no other cause but that their waters have hapned to run through *Mines of Salt*.

I doubt not but many will be apt to object against my opinion, that the *Sea* being of so prodigious boundless an extent, all the *Salt* I have spoken of, would not be able to salt it as it is; but if they please to consider, that this great extent of the Ocean may meet with *Mines of Salt* in abundance of places, and that what is once dissolv'd can never be separated from it, I am perswaded their doubt will soon vanish. Add to what is said, that *Sea water* does not contain so great a quantity of *Salt* as is commonly imagined: and this is easily prov'd, if you take the pains to evaporate some of it over the fire, or dissolve salt in that water; for it will receive a considerable quantity into it, which is a certain sign, that the water was not so salt before; as it might have been, for if it had been impregnated with as much as it could, it would have dissolv'd no more.

Therefore we have good reason to believe, that the *Sea*, which may be called a large *Lake*, becomes salt through the *Mines* that are therein, and the *Salt Currents* that in several places empty into it. Some Fountains are also seen to yield a *Salt* like this; because their waters having passed through places fill'd with this *Salt*, have dissolved and carried along with them some of it.

Salt-peter differs from these salts I speak of, in that it contains more *spirit*; so that when you take the pains to exalt a part of it, what remains is like unto *Sal Gemme*.

It may be objected that *Salt-peter* is found in places where no *Acid* liquor can be thought to come; but no body can doubt but that there is an *Acid* in the *Air*, which though a very insensible body,

body, is able enough to enter into *Stones* and *Earths*, the truth whereof is seen every day in *Earths* that have lost their *Salt* as much as could be drawn by Art, which upon being exposed some time to the open air get new additions of *Salt*, and encrease their weight considerably. Now the liquor that I speak of, which runs in some places of the earth, receives its *Acidity* from this *Acid Spirit* of the *Air*, which condenses in some places better than in others, by reason of the coolness, or some other disposition it finds there.

I conceive therefore that *Salt peter* is form'd in *Stones* and *Earths* by the *Acid spirit* of the *Air*, after the same manner as *Sal Gemme* in *Mines* by an *Acid* liquor, and that this *Aerial acid* entering insensibly into the body of *stones* produces a *Salt* at first much like *Sal Gemme*; but afterwards new *Acid spirits* still coming and mixing with it makes it of a middle nature between *Volatile* and *fixt*. And it is for this reason that a great deal of *Salt peter* is taken from old ruined buildings, for the *stones* there continuing a long time exposed to the air, receive greater quantity of *spirits* than other *stones*; it is likewise to be found in *Cellers* and other places where the *Sun* casts no heat, because the *spirit* of the air does there easily condense by reason of the coolness and moisture. But I shall discourse more amply of that, when I come to treat of the Preparations that are made upon *Salt peter*.

Nitriols, *Alums*, and all other *Salts*, that are naturally found in the *Earth*, may be explicated upon the same Principle; for according as *Acid liquors* do meet with different *earths*, they produce different *Salts*. All

All *Earths* being impregnated with an *Acid Salt*, as I have said, it is not hard to conceive how that the salt of *Vegetables* is communicated to them from the *earth* wherein they grew. Their growth must needs have proceeded from a *Saline* juice of the earth they grew in, which having opened the *Seed* through the Fermentation it caused, insinuates and filtrates into the Fibres that constitute the *Plant*; and the leaving grounds fallow some years, is in order to preserve and retain the *Salt* that is continually encreased in them by the *Acid spirit* of the air. Likewise *Dung*, and other matters, which are said to fatten and fructifie Lands, do so by nothing else but their *Salt*. Neither need we wonder at the barrenness of sandy and stony soils, for that the *Acid spirit* of the *Air* cannot unite and fix with them in sufficient quantity to render them fertile. Nevertheless it is worth observation, that there are Lands which remain barren, through too great an abundance of *Salt* they contain, and for this reason in *Egypt* they are forced to temper their grounds with *Sand* after the ebbing of the River *Nile*, to make them Fertile; because the earth, till that is done, is so full of *Salt*, that its Pores are quite choaked up with it. So that instead of causing any Fermentation in the *Seed*, the *Salt* fixes and depresses it, so that it can't have its motion free enough to rarifie, and raise a stalk; but now when *Sand* is mingled with it, it is able to divide and separate the *Salt*, which not having then such power of fixing the *Seed*, it Ferments and rises into a *Plant*. Whence it may be seen, that *too much Salt* is at least as Offensive to the earths fertility, as *too little*, and that it is the same thing

thing with other Fermentable matters as it is with Earths, they come to ferment by means of a moderate quantity of Salt mixed with them; for if you add too much, the Fermentation will be spoil'd.

Again, every kind of Salt is not fit to fertilize lands, it must be a *Volatile Salt*, or approaching to the nature of *Salt-peter*, to serve for Vegetation; a *Salt* too fixt would rather spoil it, and it has been observ'd that places which should fructifie, have brought forth nothing, when *Sea-salt* has been sprinkled upon them; the reason of which is for that this *fixt Salt* hinders the Fermentation that was necessary to fertilize.

Nevertheless it sometimes happens, that the *Ashes of Vegetables*, though full of a *fixt salt*, do serve to fertilize; and this Countrey-men are well acquainted with, who in some places where they find their Lands too poor and barrén to yield any thing without assistance of Art, do use at certain seasons of the year to burn *Fern* and *Turfs* upon them, and spread about the ashes. Now it is by reason of a *Lixivious salt* in the ashes, that the *Lands* are hereby improv'd.

But this happens for the same reason as I said before, for the *fixt Salt of Vegetables* that lies in the ashes is very porous, as I shall prove hereafter; and so does very well mix with the *Spirits* or *acid Salts* of the *Air*; and turns easily into *Salt-peter*, as when *Spirit* of *Salt-peter* is mixt with an *Alkali salt*, it makes a good *Salt-peter*.

As for *sea-salt*, possibly it might happen, that if it were left in the Earth for some considerable time, it would impregnate with the *Spirit* of the *Air*, and so being at length *Volatilized* would

render a place fertile. But because it is a very compact body, and its parts closely united, the Volatilizing of it would be a tedious business, and so the present requisite Fermentation failing, the place would remain barren too long to gratifie our expectations.

It is very likely that the *Volatile* or *Nitrous salt* meets in the Earth with some *Sulphureous* or fat matter, that is continually raised by the subterranean heat toward the surface of the Earth, and unites with it. This mixture of a *Volatile salt* and *Sulphur* together may much contribute towards explicating the manner of *Vegetation*; for just as the mixture of *Sulphur* and *Salt-peter* does excellently dispose to an *Exaltation* by heat, which will not happen while they are separated; so the Bituminous or fat part of the earth mixing with *Salt-peter*, which all Earths have, the subterranean heat exalts them much more easily, than if the Salt were alone. And now let us see what happens from this *Exaltation* to the production of Plants.

Some part of this *Sulphureous salt*, meeting with *seed* in the earth proper to grow, does enter into the *seed*, and cause a Fermentation, that is to say, suppling the parts of the *seed*, disposes it to open it self. Now 'tis very certain, (and what has been sensibly demonstrated by Microscopes) that each grain of *seed* contains in little the whole *Plant* with all its parts. Wherefore this opening the body of the *seed* is by reason that the *sulphureous salts* entering at the pores of the root of this small *Plant*, and by their *Volatile* quality insinuating along the Fibres which constitute the *Plant*, do orderly display before us what was before but very confused in respect of us.

These

These *salts* do never enter at the head of the Plant, and so descend to the Root, though often the Root of the Seed lies uppermost, and the head or stalk downwards, because the Pores of the stalk are not of such a Figure as is proper to receive them, whereas those of the Root have a proper contexture.

The *Volatility* of these *Salts* does also cause the stalk, though seated downwards, to rise upwards, and follow their tendency, which is always up; and this is that which by extending and enlarging the Fibres of the Plant, makes it grow to that height which their nature requires.

'Tis probable that this fat part of earth insinuating with the *salt*, as I have said, does make the *Oyl* of a mixt body; for we find that those matters which help best to fertilize, are full of *Volatile Salt* and *Oyl*, as *Dung*, *Urine*, and *Plants* corrupted.

'Tis fit to observe here, that the *salt* does act after another-guise manner than the *Oyl* in hindring the Fermentation or corruption of the matter it is mixed with; for it does not only stop the pores, and hinder the air from entering, but fixes it likewise by its hooked parts, that it can neither have motion nor rarefaction, for which reason it is that *meat* is salted in order to keep it sweet, and does thereby remain firm and compact for some time.

Three kinds of *salt* are drawn from *Vegetables*, an *Acid salt* called *Essential*, a *Volatile*, and a *Fixt salt*. The first is sometimes like *Salt-peter*, and sometimes like *Tartar*, according as it contains more or less earth; this *salt* is drawn from the juice of the Plant, as I said before; for after ex-

pression and purifying this *juice*, it is set in a vessel in some cool place a few daies without stirring, and the *salt* shoots into *Crystals* every way. This *Acid salt* may be said to be the *true salt* that was in the *Plant*, because the means that are used in drawing it are *Natural*, and such as cannot change its nature; but this can't be said of those others, because the violent fires that are used about them make impressions of another nature, and their effects are very different, so that the fire seems to alter and disguise them, as I shall shew in the following discourse.

The second *salt*, or the *Volatile salt* of *Plants* is usually drawn from *seeds* or *fruits* Fermented. While it remains in the *Vegetable*, it differs from the *Essential salt* only in this, that being driven up higher by *Spirits*, it becomes more *Volatile*. The *Fermentation* that is caused in fruits by beating and bruising them, does very much assist us in *Volatilizing* the *salt*; for it sets the particles at work, and disposes them for an easier separation; but it happens that in the great circulation, or continual motion this *salt* is in, it unites so strongly with the *Oyl*, which Fruits and Seeds are full of, that they can't be separated by *Crystallizing* the *juice*, as they can in drawing them from other parts of the *Plant*. We must therefore have recourse to the help of fire. The *fruit* or *seed* which contains the *Volatile salt*, as I shall prove in its proper place, is Distilled by a *Retort*, and *Water* comes forth in the first place, then an *Oyl*, and lastly a most keen ill scented *salt* (that easily flies away) upon encreasing the fire to purpose, is driven into the *Receiver*. Now it is plain that fire has
chang'd,

chang'd, or else added something to this *salt*; for when it was in the *Plant*, it had no manner of smell like that it gets by *distillation*. But to shew there's a strange alteration in this *salt*, as soon as it is mixed with an *Acid*, there presently appears an *Ebullition*, or *Effervescency*, which remains until the *Acid* has throughly entred into the *salt*. Which circumstance does not happen to it in its *Natural* state, it is this *Ebullition* that gave it the name of a *Volatile Alkali*, to distinguish it from a *Fixt Alkali*, of which I shall speak hereafter. The *Chymists* will needs have this *Volatile Alkali* to be in the *Plant*, just the same as when it is drawn; that is to say, they make this a different *species* of *salt*, lying hid under the *acid*, until it is laid open by the force of fire. But this opinion is founded on no credible experience, for *Anatomize* the *Plant* how you think fit, without using fire, and you shall never find any other but an *acid salt*. Doubtless it will be said, that all other ways of dissecting *Plants* even into their *salts*, prove too weak without the assistance of this grand dissolvent fire. But if we consider impartially how fire does act, we shall be forced to acknowledge that it rather destroys, and confounds the greatest part of the bodies it opens, and does not leave them in the *natural* state they were in before, and especially when it is driven with that force which is necessary to draw this *salt*. So that I see no reason why the *species* of things should be multiplied without necessity, by admitting many kinds of *salts* in *Plants*, and I conceive with much more probability, that the *Volatile Alkali salt* is a part of the *Acid Essential salt* I spoke of, which having been first disposed to a *Volatile* na-

ture, and afterwards driven by the force of fire, draws along with it a portion of *Empyreumatical* Oil, that gives it such a disagreeable smell, and some terrestrious calcined matter, with which it is so strongly united, and which changes its nature, by breaking the *Saline* points, and rendring them *Porous*, so that any *acid* liquor being cast upon it, enters into the Pores, and violently divides the parts, whence follows the *Effervescency*. Perchance likewise this *Calx* or Calcined earth may have retained igneous particles, and so the edges of the *acid* beginning to open the pores of *salt*, these little igneous bodies being in a violent motion do strike about, and break open all their small prisons, and from thence it may be, the violent *Ebullition* happens. Such as are prejudiced with the Sentiments of ancient *Chymists*, will relish very hardly this new Opinion of mine; but I am perswaded if any one will take the pains to examine the matter near at hand, and make some *Experiments* on the *salts* of Plants, he will find my Discourse come near enough to truth.

The last *salt* or the *fixt salt* of Plants remains mixed with the earthy part after *Distillation* of the other substances; the matter is taken out of the *Retort*, and calcined in an open fire, for to free it from the *soot* that blackens it; afterwards the *salt* is drawn by a *Lixivium* as I have shewn before. This *salt* is called *fixt*, in comparison with others, because this cannot *sublime*.

It is observable, that because a great quantity of this kind of *salt* is drawn from a plant called *Kali*, the name *Alkali* has been given to the *fixt salt* of all plants; and that because an effervescency

does

does rise upon mixing an *acid* liquor with this Salt, all Volatile or fixt salts, and all *terrestrious* matters which ferment with *acids*, have come to be called *Alkali's*.

The *Chymists* do assure us, but with little foundation for it, that in Terrestrious bodies, in *Metals*, *Coral*, *Pearl*, and generally in all bodies that Ferment with *acids*, there is an hidden *Alkali* in them, which is one of the Principles of *Fermentation*, wherefore they give them the names of *Alkali's*; but because no manner of Salt can be drawn from them, to prove their Opinion, and they have no other rational Argument to perswade me, they must give me leave to think otherwise than they have done, and I conceive that the contrary to what they have established will serve me better to explicate the truth.

Following therefore the *Principle* I have laid, I believe that those Terrestrious bodies are themselves *Alkali's*, rather than that the *Ebullition* of *Acid* and *Alkali* proceeds from a salt supposed to be contained in them; and further that the salts are never *Alkali's* until they have undergone the force of fire, and been reduced into a *Calx*. I have proved, speaking of the nature of *Volatile salt*, that the fire did very much change the substances of things; and as I have shewn there is good reason to think there is but only one species of salt in Plants, and the *Volatile salt* is but a change wrought by fire; I shall proceed upon the same *Principle*, and affirm that there is no fixt *Alkali salt* in Plants, but that by *Calcination* the fire has fixt a part of the *acid Essential salt* with the earthy part that has serv'd to break the keenest

of its points, and rendred them Porous, like a *Calx*. It is by reason of these Pores that this kind of salt grows humid, and melts so easily when exposed to the Air; and the Terrestrious parts do turn it into an *Alkali*, for if they were not mixed with it, it would continue still an *acid salt*, and opposed to *Alkali*. But to clear up this point the better, we must consider as nicely as may be the nature of an *Acid* and an *Alkali*.

Whereas the nature of a thing so obscure as that of salt, cannot better be explicated, than by admitting to its parts such figures as are answerable to the effects it produces; I shall affirm, that the acidity of any liquor does consist in keen particles of salts, put in motion; and I hope no body will offer to dispute whether an *acid* has points or no, seeing every ones experience does demonstrate it, they need but taste an *acid* to be satisfied of it, for it pricks the tongue like any thing keen, and finely cut; but a demonstrative and convincing proof that an *acid* does consist of pointed parts is, that not only all *acid salts* do *Crystallize* into edges, but all Dissolutions of different things, caused by *acid liquours*, do assume this figure in their *Crystallization*; these *Crystals* consist of points differing both in length and bigness one from another, and this diversity must be attributed to the keener or blunter edges of the different sorts of *acids*; and so likewise this difference of the points in subtilty is the cause that one *acid* can penetrate and dissolve well one sort of mixt, that another can't rarifie at all: thus *Vinegar* dissolves *Lead*, which *aqua fortis* can't: *Aqua fortis* dissolves *Quick-silver*, which *Vinegar* will not touch; *Aqua Rega-*

Regalis dissolves *Gold*, whenas *Aqua fortis* cannot meddle with it; on the contrary *Aqua fortis* dissolves *Silver*, but can do nothing with *Gold*, and so of the rest.

As for *Alkali's*, they are soon known by pouring an *acid* upon them, for presently or soon after, there rises a violent *Ebullition*, which remains until the *acid* finds no more bodies to rarifie. This effect may make us reasonably conjecture that an *Alkali* is a terrestrious and solid matter, whose pores are figured after such a manner that the *acid* points entring into them do strike and divide whatsoever opposes their motion; and according as the parts of which the *Alkali* is compounded, are more or less solid, the *acids* finding more or less resistance, do cause a stronger or weaker *Ebullition*. So we see the *Effervescency* that happens in the dissolution of *Coral* is very much milder than that in the dissolution of *Silver*.

There are as many different *Alkali's*, as there are bodies that have different pores, and this is the reason why an *acid* will Ferment with one strongly, and with another not at all; for there must be a due proportion between the *acid* points, and the pores of the *Alkali*.

The nature of *Alkali's* being thus established, there will be no need of flying to an imaginary salt in Plants for explication of the *Effervescency*; and 'twill be easily conceived that if an *Alkali salt* is full of a terrestrious matter that renders it porous like other *Alkali's*, it must cause an *Ebullition*. That which I said, speaking of Volatile salts, may here be added, that the Igneous particles breaking in through the Pores of the *Alkali salt*, wherein they

they became imprisoned by the Calcination, do much contribute to the raising this *Effervescency*. And really when the Acid Spirit of *Vitriol*, or *Aqua fortis* is cast upon an *Alkali salt*, there happens as strong an *Ebullition*, as when this liquor is flung into the fire it self.

Acid Salts do rarely cause any effervescency with Acid liquors, because their pores being very small, the common acids are not able to pierce into them; but we do sometimes meet with Acids whose points are so fine and so proportioned to the pores of the Salts, that they will find an entrance even into the exceeding little pores of these Acid Salts, and thereby cause a commotion. And then these Salts, although they be Acid, yet may be called *Alkali's* in respect of such keen Acids. This does happen to Sea-salt, which is an Acid, for though it will make no *Ebullition*, neither with Spirit of salt, nor with Spirit of *Niter*, nor with Spirit of *Alom*, nor with Spirit of *Vitriol*; yet if you mix it with the strongest Oil of *Vitriol*, there will rise an *Effervescency*. Wherefore it may be said that one Acid Salt is an *Alkali* in respect of another, because there being few bodies without some pores, few of them will prove to be impenetrable, when they meet with Acids of an extraordinary subtilty.

The Fermentation that happens to *Dom*, to new *Wine*, and such like things, differs from that I now spoke of, in that it is more gentle, and slow; this is caused by the Natural Acid salt contained in them, which expanding and exalting it self by its motion, does rarifie and raise up the grosser and sulphureous part which endeavours to allay its motion,

motion, from whence it comes that the matter swells up.

The reason why an Acid does not make Sulphureous things Ferment, with so much noise and suddenness as Alkali's, is, because that *Oyls* consist of pliant parts that yield and make no resistance to the points of Acids, as a piece of *Wool* or *Cotton* will yield and give way to needles that are thrust into it. Thus methinks two sorts of *Fermentations* may be admitted of, the one of an Acid with an Alkali, which may be called *Ebullition*, and the other, when an Acid does by little and little rarifie some softish matter, as *Dew*, or clear and Sulphureous, as *Muske*, *Syder*, and all other juices of Plants. This last sort may rather be called *Fermentation*.

It is further remarkable that the Acid and Alkali do so destroy one another in their conflict, that when as much Acid has been by degrees poured as is necessary to penetrate the Alkali in all its parts, it is then no more an Alkali, nor can it be so again, though you wash it to carry off the Acid, because it has no longer that *disposition* of *Pores* which is requisite in an Alkali; and the Acid breaks and loses its points in the contest, especially when the Alkali is pretty compact and solid; so that if you would recover your Acid again, you'll find it has in a manner lost all its acidity, and retains only a sharpness. But the *Sulphur* or *Oyl* consisting of supple yielding parts does only receive some Acid impression, and no such close union, so that it can be drawn from Sulphureous bodies much the same as when it was mixt.

Ani-

Animals do yield us two sorts of *Salt*, the one Volatile, and the other Fixt; of the first sort they yield greater quantity than of the second, because they do abound much in Spirits, which by their continual circulation do Volatilize it. This *Salt* differs but little from the Volatile salt of *Seeds* and *Fruits*, both which are drawn in a *Retort*; they have the same kind of smell, taste, and other virtues. The Volatile salt of *Animals* keeps dry a longer time than the others, because it carries away with it more *fixt salt* than those others. As for *fixt salt*, *animals* do yield but a very little of it, and in some *animals* you shall find none at all; it is drawn as the *fixt salt* of *Plants*; they are both *Alkali's*.

There is no *salt* that can be called alkali, to be found in the parts, or humors of *Animals*, until they have passed the fire; a Saline serosity may be observed in them, but that salt is *acid*; and it proceeds doubtless from the *Aliments* that are taken for nourishment. Now as I have shewn that there is only an *acid salt* in *Earths* and *Vegetables*, so I may say the same of *Animals*, and the rather because no other kind of *Salt* can be found in them in their Natural state; the alkali salts that are drawn from them, are only several mutations of an acid salt, made by fire, which mingles with them earthy particles after the manner I have spoken of treating of the *Alkali's* of *Plants*. But it is observable, that whereas there is a greater proportion of Spirits in *Animals* than *Seeds*, these Spirits do serve to exalt all the *Salt*; which is the reason that less *fixt salt* is to be found in *Animals* than *Plants*.

As

As for what many do say that *Choler* causes an Effervescency like an Alkali, when an *acid* is cast upon it, 'tis a mistake through want of right Observation, for no Ebullition at all happens for some time. Nevertheless I will not say, that an *acid* produces no Fermentation in *Choler*, *Bloud*, and other parts of the body, for it does very often really do that; but that is no more than uses to be done in new *Wine*, *Beer*, and other liquors of the like nature. I have already explicated this sort of *Fermentation*.

We ought not to omit speaking of the *Coagulation* that's made in Milk after a *Fermentation* caused either by *Heat*, or some *Acid* put into it.

Methinks here is no need at all of supposing an Alkali salt, that ferments with the *Acid* of this liquor, as many suppose for explicating this Effect, since if we consider but the natural composition of *Milk*, we shall find it to be nothing but a Creamy substance swimming on the *Serum*, and mixed only superficially with it, by the intermixture of some salt; so that it is in a fitting state of separation, as soon as the salt gains a little more motion than it had, whether it be by *Fermentation*, or by encreasing its activity by an *acid* of its own nature. Thus when the heat of the Summer, or fire has stirred up the *acid* that is in the Milk, or else some *acid* is poured into it, the edges of the *acid* do cut and divide the Creamy part, to gain a free motion in the *Serum*, and separate into *Curd* all the Butter and Cheese. Now there's nothing strange in the *Precipitation* of the *Curd*, especially when an *acid* has been poured upon the Milk, for besides the weight it gains by thickning, some part
of

of the *acids* do mix with it, and encrease its weight; for according as the *acid* that was mingled is stronger or weaker, the *Curd* does *Precipitate* more or less.

Perhaps some will say, for as much as *acid* is always the cause of *Coagulation* in Milk, there's no great likelihood that a salt of the same nature should be the instrument of uniting the several parts of *Milk*.

But it must be considered, that although there is an *acid* in *Milk* (as no body can doubt, seeing it sowers of it self, when stale) this *acid* is as it were imbodyed in the ramous parts of the *Oyl*, so that there it loses all its motion and cannot come to action but by rarifying the *Oyl*, and making it fit to mix with the *serous* part; it is the due proportion of this *salt*, *Oyl*, and *serum*, that makes the *Butter* and *Cheesy* part of Milk.

Now I hope I have said enough to establish what I have affirmed, that there's no salt in nature besides the *acid*, out of which all other Salts are made, and that the Alkali salt has no *Natural existence* in mixt bodies. My discourse will be the better relished when I speak of the Operations of Chymistry, and you'll find that by this *Principle*, which I may call the most Natural and impartial of all that have been laid till now, I shall be able to give account of many *Phænomena's* that have never been explicated by common Principles.

Of Chymical Furnaces and Vessels.

It is not my design to relate here exactly all the kinds of Vessels and Furnaces that Artists have invented to use in Chymistry. I shall describe only those with which you will be able to perform all Operations, and send curious persons, who would be more particularly instructed in them, into the Laboratories, where they may learn more on this subject than ever they will be able to do by consulting all the Books in the world. These then are the principal.

The *Furnace* which is most in use among Chymists is that which is called the *Reverberatory*; it must be large enough to hold a great Retort, for the Distillation of acid Spirits, and other things. This Furnace must be fixt, and made of Brick, joyned together with a Lute compounded of one part of Potters earth, so much Horse-dung, and twice as much Sand, the whole kneaded together in Water; let it be two Bricks breadth, that the Furnace being the thicker, the heat may be retained the longer: let the Ash-hole be a Foot high, and the Door contrived, if possible, on the side that the air comes, that when you have a mind to open it, the Fire may be lighted or encreased the more easily; the fire room need not be quite so high; you must lay a-cross it two Iron-bars of the bigness of your thumb, which will serve you to set your Retort upon; and the Furnace must be still raised near about a Foot higher, to cover the Retort; fit to it a Dome, or Cover,
that

That may have a hole in the middle with its stopple, and a small Chimny a foot high, for to place upon this hole, when the stopple is taken out, and when you would raise a great heat; for the flame preserving its self by means of this little Chimney, it reverberates the more strongly upon the Retort. This Cover may be made of the same Paste, that I shall presently describe, speaking of Portable Furnaces.

It will be necessary to have several Furnaces of this same fashion; but they must be of different sizes, to work conveniently according to the bigness of the Vessel you would place in it. For that the Fire may act more vehemently upon the Retort, there must be left but only the space of a fingers breadth all round between the Furnace and the Retort. These Furnaces may also serve for Distilling by the Refrigeratory, in the Sea-Bath, the Vaporous and the Sand-bath; for you may place the Copper body upon the Iron bars, when you would distil by the Refrigeratory. It is easie to do the same with the *Balneum Maria*. As for the Sand-bath, lay an iron or earthen pan on the bars, and put sand enough into it for to cover the bottom and sides of the Vessel you desire to heat.

As for Fusions, you must build a Furnace of the same matter and form as those spoken of before; only you must forbear laying the two Iron bars in it, that you did in the others, for support of the Vessel.

Moveable Furnaces are made of a paste that consists of three parts of broken pots in powder, and two parts of clay temper'd together with Water. Their structure is just like that of the Reverbe-

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An Explication of the FIGURES of the
FIRST TABLE.

- A** Great Reverberatory Furnace.
a The Ash-hole.
b The Fire-room.
c A Retort supported on two Iron bars.
d The Dome, or Cover.
e The Receiver.
f A little Chimny.
g The Dome taken off the Furnace.
h A Retort.
i A small Reverberatory Furnace ready to work
with.
k A fixed little Furnace for Fusions.
l An Iron pot to hold the sand.
m The Fire-place.
n The Ash-room.
o A Furnace in which is placed a great Copper
Body.
p The Copper Body tinn'd o'th' inside, supported
on two Iron bars.
q The Head.
r A copper Pipe tinn'd, passing through a vessel
filled with water.
s A glass Receiver.
t A small Iron Furnace.
u An Iron pot.
x The Cover to the Iron pot.
y A Cock to let the water out of the vessel, when
it grows too hot.
z A Matraß, or Bolt-head.

The

Place this between page 32, and 33.

The FIRST TABLE.



The SECOND TABLE.

- aa **A** Moveable Furnace for fusions.
 b Registers, or holes to let the air in to the fire.
 c A Dome divided in two.
 d A little Chimny, and the flame passing through it.
 e An Iron trevet to support the furnace.
 f A glass Mortar, with its Pestle.
 gh A pot with a coffin of paper over it, for receiving the Flowers of Benjamin.
 ikl A Matras, or Bolt-head, and its blind-head, for sublimations.
 mn A great earthen pan, with a little Cup turned upside downwards. A Crucible containing the lighted Sulphur. A great glass Tunnel, to draw Spirit of Sulphur.
 o A Mould.
 p A copper Body.
 q Its Refrigeratory.
 r The Receiver.
 s A Circulating vessel.
 t A Pot with a hole in the middle of its height, and the stopple of the hole lying by.
 u Three Aludels, or Pots upon one another.
 x The glass head.
 y A Mould to make the balls of Regulus of Antimony, which are called perpetual Pills.
 z The Mould wherewith to form the lapis infernalis.
 aa A little furnace, and its pan with sand in it, and an earthen pan filled with liquor to be evaporated.
 bb A Coppel.
 cc A little Coppel to make trials with.

The

The SECOND TABLE

Tab. 2.



THE THIRD TABLE.

- A** *Moveable Furnace to distil in Sand.*
a *The Ash-hole, and its door.*
b *The Fire-place, and its door.*
c *The Cucurbite, or Body.*
d *The Sand, wherein the Body is placed.*
e *The Head.*
f *The Receiver.*
g *The same Furnace empty.*
h *A Body.*
i *A Head.*
k *A glass in which Oil of Cloves is made.*
l *A Copper Balneum to contain, and distil with four Alembicks.*
m n *A Pipe through which the hot water is poured into the Balneum, according as it evaporates.*
o *The Receiver.*
p *A Balneum to distil with one Alembick.*
q *A Mold to make Cups of Regulus of Antimony.*
r *A French Crucible.*
s *A German Crucible.*

The THIRD TABLE.

Tab. 3.



THIRD TABLE.



Reverberatory Furnace. You may also leave holes through which the Iron-bars may pass, which support the Retort that they may be easily taken out, when you have a mind to use this Furnace for Fusions.

A Furnace of this form may be called *Polychrest* (or general) because such a one may be used for all sorts of Operations.

It is likewise convenient for Fusions, to have a moveable Furnace of the same matter as the others; it must be round, and may be set upon a stool: it is to have only one grate, and six Registers, or holes on the sides, to let in the air to the fire. The Dome may be made of the same matter, for to cover it, and a small earthen Chimney for to place upon the hole of the Dome, that the fire may keep the stronger. See the figure of it in the second Table.

You must be sure to put sand, or broken pots, or such like things into the Paste that you use for the building Furnaces, either fixt, or moveable, to hinder them from cracks, when they come to dry; for these matters rendring the clay more porous, the wet breaths out much the more easily.

Again, Lime and Sand tempered together, might serve for the building your fixt Furnaces, and stones might be used instead of bricks; but because it is necessary to increase and lessen the Furnaces, to proportion their size to the vessels you would place in them, the description which I gave before is the more convenient, for that a man may very easily break them, and build them again, without the help of a Brick-layer.

A small Iron Furnace with its iron pot, and a cover to it, is convenient for performing many operations; this pot may serve for a *Balneum Mariae*, and for a Vaporous Bath, when there is no other. It may be likewise used to distil by an Alembick, in a Bath of Sand, Ashes, or of filings of Iron. See the description of it in the first Table.

A great Iron Furnace should likewise be had, whereon to place a Copper *Balneum Mariae*, for to distil with four bodies at once. In the middle of this Bath there should be a pipe raised, the top of which must be made like a Funnel, into which you are to pour hot water, in place of that which consumes away in vapour. See its figure in the third Table.

As for Vessels chuse them as much as may be of Earth or Glass; for it is to be feared that those which are made of Metal will communicate some particular impression to the Liquors you put into them: but because sometimes you may have occasion to distil a great many things in a little time, you may use the Copper-Cucurbit, or Body Tinn'd, because that Tinn is not so soluble as Copper, and besides hath no such pernicious quality: upon this Cucurbit place a fit head, round about which must be made a kind of basin to hold the water that cools and condenses the vapours which rise from the Matter contained in the *Vesica* so soon as it is heated. See its description in the second Table.

You may likewise provide a Copper pipe tinn'd o'th' inside, which may pass sloping downwards through a vessel fill'd with water; and when you would distil Essences with it, you must fit the upper end

end of it to the nose of the head, and the lower end of it to the mouth of the Receiver; but you must remember to empty the water out of the vessel, according as it grows hot, for to cool the liquor that is distilling; and to this end there must be a hole made at the bottom of the vessel, to be stoppt with a wooden stopple, which may be taken out, and put in again, as often as you would let out the water.

The *Moor's head* is a Copper cap tinn'd on the inside, made like to a head. See the figure of it in the first Table.

Many Retorts of different sizes are necessary in a Laboratory; those which are of Earth are convenient for the distillation of Acid Spirits, because they are able to endure the utmost degree of Fire, and will not melt as glass do. The Vessels made of Earth have their pores as close as glass it self, and preserve the Spirits as well. They who want Earthen Vessels may coat their glass Retorts with the Lute that I shall describe hereafter, that if the glass should melt, when they are distilling Acid Spirits, the Lute may preserve the matter safe.

Earthen, and Glass Cucurbits, with their heads, do serve for a great many Operations.

Marrasses both great and small, when they are fitted to the nose of a Limbeck, are called *Receivers*; at other times we put things into them to digest: and they are also fit for sublimations. When the neck of one *Marrass* is put into the neck of another, they are called a *double vessel*, and this is done when we desire to circulate Spirits, but then the junctures must be very well luted.

You must also provide many large capacious *Receptients* for the Distillation of Acid Spirits by a Retort. They must be so very large, that the Spirits may have room to Circulate the better.

Lingots are Iron molds of divers shapes, into which melted Metals are wont to be poured, in order to harden in the form that we would have them. That which is used for the making *Lapis infernalis* must consist of two pieces joined together with two little Iron rings, and the melted matter is poured into the upper part of it. See its figure in the second Table.

Coppels are porous vessels made in form of a cup, to be used for the trying and purifying of Gold and Silver. They are made of Ashes well washed, or of bones calcined. See their figure in the second Table.

Ashes deprived of their salts are rather used than others, for the composition of this sort of vessels, that they may be made the more porous, by such deprivation. See the Chapter concerning Purification of Silver by the Coppel, and the Remarks upon it.

Many glass Funnels great and small, Viols of glass, Crucibles, Pans, Mortars of glass or stone, or Marble or Iron, must not be forgotten.

Aludels must also have a place there; they are Pots without a bottom, joyned together, and are placed over another Pot with a whole in the middle, to serve for Sublimations.

Of Lutes.

The Fire is often raised to so high a degree as will melt glass Retorts in a Reverberatory Furnace, wherefore it will be convenient to coat them over with such a Lute, as when dry is able to preserve and contain the matter that is put into them to be distill'd. This Lute may be made after the manner which follows.

Take Sand, the dross of Iron, Potters earth in powder, of each five pounds, horse-dung cut small a pound, glass beaten into powder, and Sea-salt, of each four ounces, mix them all, and with a sufficient quantity of water make a Paste or Lute, with which you must coat the Retort all round, to half its neck, and so set it a drying. This same Lute will serve to stop close the junctures of the neck of the Retort with the Recipient; but because when it dries, it grows exceeding hard, and it proves difficult to unlute it, it is needful to wet it with wet clothes, when you would take the Retort asunder from the Receiver.

The *Lute* that I commonly use my self for such occasions, is compounded only of two parts of Sand, and one of clay tempered together with water.

As for the conjunction of Limbecks, ordinary Glue upon paper will serve turn: but when something very spirituous is distilled, such as the Spirit of Wine, use a wet Bladder, which carries a Glue along with it, that sticks very well. But if the bladder happens to be eaten or corroded by

the Spirits, have recourse to the following Glue.

Take Flower, and Lime slackt, of each an ounce, Potters-earth in powder half an ounce, mix them, and make a moist Paste with a sufficient quantity of the Whites of Eggs well beaten before hand with a little water. This Paste may likewise serve to stop the cracks that happen in glass vessels, there must be three lays of the Paste bound on with paper.

To Seal Hermetically, is to stop the mouth or neck of a Glass-Vessel with a pair of Pincers heated red hot. To do this, the neck is heated by little and little with burning coals, and the fire is increased and continued, until the Glass is ready to melt. This way of sealing a Vessel is used, when you have put some matter within it that is easie to be exalted, and you have a mind to make it Circulate.

Of the Degrees of Fire.

To make a Fire of the First Degree, two or three coals lighted will suffice to raise a most gentle heat.

For the Fire of the second degree, three or four coals will serve, to give such a heat as is able sensibly to warm the Vessel, but so as a hand may be able to endure it for some time.

For the Fire of the Third degree, you must cause heat enough to make a Pot boil, that is fill'd with five or six quarts of water.

For

For the Fourth Degree, you must use Coals and Wood together, enough to give the most extream heat of all.

The Fire of Sand, of the filings of Iron, and of Ashes, is made, when the Vessel that contains the matter that is to be heated is covered underneath and on all sides with Sand, or the filings of Iron, or with Ashes; this is done to heat the Vessel the more gently.

All these Fires have their Degrees, but the Ash-fire is the mildest, because the Ashes cannot contain so great a heat as the others.

The Reverberatory Fire is made in a close Furnace, that the heat or flame which always tends upwards, may reverberate or return upon the Vessel which is placed on two Iron bars. This fire hath its Degrees, but may be raised to a greater violence than the rest.

The Wheel fire, for Fusion, is made when with lighted coals you encompass all round a Crucible, that holds the matter you desire to melt.

The *Balneum Maria* is, when an Alembick containing the matter that is to be heated, is placed in a Vessel filled with Water, under which the Fire is made; thus the water growing hot, heats the matter contained in the Alembick.

The Vaporous Bath is, when a Glass vessel containing some Matter is heated by the vapour of hot water.

Explication of many Terms that are used in Chymistry.

To *Alcoholize*, or reduce into *Alcohol*, signifies to Subtilize, as when a Mixt is beaten into an impalpable powder. This word is also used to express a very pure Spirit; thus the Spirit of Wine well rectified is called the *Alcohol* of Wine.

Amalgamate is to mix Mercury with some melted Metal; this Operation serves to render the Metal fit to be extended on some Works, as Gold, or else to reduce it into a very subtile powder, which is done by putting the *Amalgame* into a Crucible over the Fire: for the Mercury subliming into the Air leaves the Metal in an impalpable powder; neither Iron nor Copper can by any means be *Amalgamated*.

Cement is a manner of purifying Gold. 'Tis done by stratification with a hard paste made of one part of Salt Armoniack, two of common Salt, and four of Potters earth, or Bricks powdered, the whole having been moistned with a sufficient quantity of Urine: this Composition is called *Royal Cement*.

Circulation is a motion given to liquors contained in a double vessel, excited by fire, and causing the vapours to ascend and descend to and fro. This operation tends either to subtilize the liquors, or to open some hard body that is mixed with them.

Coagu-

Coagulate, is to give a consistence to liquids, by evaporating some part of them over the fire, or else by mixing liquors together that are of a different nature.

Cohobate signifies to repeat the Distillation of the same liquor, having poured it again upon the matter that remains in the Vessel. This Operation is used to open Bodies, or to Volatilize the Spirits.

Congele, is to let some matter that is melted fix, or grow into a consistence, as when we let a metal cool, after it has been melted in a Crucible; or else it is when wax, fat, butter, or the like, are taken from the fire and set to cool.

Detonation is a noise that is made when the Volatile parts of any mixture do rush forth with impetuosity; it is also called *Fulmination*.

Digestion is, when some body is put to steep or infuse in a convenient *menstruum*, over a very gentle heat.

Dissolve, is to turn some hard matter out of a hard into a liquid form, by means of a certain liquor.

To Distil *per ascensum*, is, when fire is put under the Vessel that contains the matter which is to be heated.

To Distil *per descensum*, is, when fire is placed over the matter that is to be heated; for then the moist parts being rarified, and the vapour which rises from them not being able to arise away upwards as it would do if not hindered, it precipitates and distils at the bottom of the vessel.

Edulcorate, is to sweeten some matter, that is impregnated with Salts, by means of common water.

Extract,

Extract, is to separate the purer part from the grosser.

Fermentation is an ebullition raised by the Spirits that endeavour to get out of a Body; for meeting with gross earthy parts that oppose their passage, they swell and rarise the liquour until they find their way out; Now in this separation of parts, the Spirits do divide, subtilize and separate the principles so, as to make the matter be of another nature than it was before.

Filtrate is to purifie a Liquor by passing it through a Coffin of brown paper.

Fumigate is to make one Body receive the Fume of another.

Granulate is to pour a melted Metal drop by drop into cold water, that it may congeal into grains.

Levigate is to reduce a hard Body into an impalpable powder upon a marble.

Mortifie is to change the outward form of a Mixt, as is done in Mercury. Also Spirits are said to be *Mortified*, when they are mixed with others that hinder or destroy their strength.

Precipitate is to separate a matter that is dissolved, so as to make it fall or settle at the bottom.

Rectifie is to Distil Spirits, for the separation of what Heterogeneous parts might have been drawn along with them.

Reverberate is to cause the flame of the Wood or coals that's lighted in the Furnace, to beat back upon the Vessel, by means of a Dome placed over it.

Revive is to restore a Mixt to its former condition that lies disguised by Salts or Sulphurs. Thus Cinnabar, and the other preparations of Mercury are *Revived* into Quick-silver.

Stratise is to lay different matters bed upon bed. This operation is performed when we would Calcine a Mineral or Metal with a Salt, or some other matter.

Sublime is to raise by Fire any Volatile matter to the top of the Cucurbit, or into its Head.

T H E

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THE
FIRST PART.
Of Minerals.

WHatsoever is found *Petrified* in the Earth, or upon the Earth is called *Mineral*.

Petrification is made by a *Coagulation* of *acid* or *salt waters*, that are found in the pores of the Earth.

This *Petrification* differs according to the divers dispositions, or different nature of the Earth, and according to the time that Nature uses in its perfection.

The growth of *Minerals* proceeds from an accumulation, or from several veins of congeled Waters, that do as it were glue together, and these veins are the cause that all the adjacent parts have their *Sinus*, and meetings a travers one another, and not running directly downwards.

These *Sinus*, like so many joints, are of great help to Labourers to cut in the Quarries; for by those cavities the stones are in great measure separated before hand, whereas 'twould be extream hard working them out, if nature had not so concurred.

The growth of *Minerals* is very different from that of *Vegetables*, and *Animals*; for whereas the former

former does happen through an agglutination of congeled waters, as I have said; the latter is performed by means of *juices* that insinuate and spread in the vessels and fibres, that *Animals* and *Plants* do consist of.

Metals do differ from other *Minerals* in being malleable, which the others are not.

They are counted seven, *Gold*, *Silver*, *Iron*, *Tinn*, *Copper*, *Lead*, and *Quicksilver*, this last is not malleable of it self, but is so mingled with the others; and because this is thought to be the *Seed* of *Metals*, it is numbred with the rest.

Astrologers have conceited that there was so great an affinity and correspondence between the *Seven Metals* before named, and the seven *Planets*, that nothing hapned to the one, but the others shared in it; they made this correspondence to happen through an infinite number of little bodies that pass to and from each of them; and they suppose these corpuscles to be so figured that they can easily pass through the pores of the *Planet* and *Metal* they represent, but cannot enter into other bodies because their pores are not figured properly to receive them; or else if they do chance to get admittance into other bodies, they can't fix and stay there to contribute any nourishment; for they do imagine that the *Metal* is nourished and perfected by the *Influence* that comes from its *Planet*, and so the *Planet* again the same from the *Metal*.

For these reasons they have given these seven *Metals* the name of the seven *Planets*, each accordingly as they are governed: and so have called *Gold* the *Sun*, *Silver* the *Moon*, *Iron* *Mars*, *Quick-*
silver

silver Mercury, Tinn Jupiter, Copper Venus, and Lead Saturn.

They have likewise fancied that each of these *Planets* has his day apart to distribute liberally his *Influence* on our Hemisphere; and so they tell us that if we work upon *Silver* on *Munday*, *Iron* on *Tuesday*, and so of the rest, we shall attain our end much better than on other days.

Again they have taught us that the seven *Planets* do every one govern some particular principal part of our bodies; and because the *Metals* do represent the *Planets*, they must needs be mighty *specifick* in curing the distempers of those parts, and keeping them in good plight. Thus they have assigned the *Heart* to *Gold*, the *Head* to *Silver*, the *Liver* to *Iron*, the *Lungs* to *Tinn*, the *Reins* to *Copper*, and the *Spleen* to *Lead*.

Thus you see in short what some of the most *sober Astrologers* do fancy concerning *Metals*, and they draw consequences from hence, which 'twould be too long here to relate. I have told you what the soberest among them say; for nothing can be so absurd as what some of them would have us believe.

'Tis no hard matter to disprove these conceits, and shew how groundless they are; for no body ever yet got near enough to the *Planets*, to satisfy himself whether they are really of the same nature with *Metals*, or whither any *Effluvijs* of bodies do fall from them to us.

Nevertheless if we could be satisfied that Experience did confirm what these persons have offered to maintain, we might then have some reason to think there were some likelihood in their doctrine,

doctrine, although their principles were found to be altogether false; but in truth there's nothing to confirm their Opinion, and we find it every day plain enough, that the Faculties and Virtues are utterly false, which they do attribute to the *Planets* and *Metals*; the *Metals* indeed are of good use in *Physick*, and excellent *Remedies* may be drawn from them; but their effects may better be explicated by Causes nearer at hand than the *Stars*.

CH A P. I.

Of Gold.

G*OLD* is most esteemed among the seven Metals, because it is more perfect, more weighty, and is thought to receive the influence of the most glorious body among the Stars, which is the *Sun*. It is also called the *King of Metals*, for the same reason; it is a matter the most compact of any, malleable, unequal in its parts; insomuch that Pores of different figures are observed in it, when it is viewed with a good Microscope.

Gold is found in *Mines* in several places, both in *Europe*, and other parts of the world; it is usually attended with *Water* and very hard stones, such as are extream hard to dig; there are likewise

with several *stones* that contain particles of *Gold*, such as are called *Golden Marcastites*, the *Lapis Lazuli*, and *Lapis Armenus*.

Gold will spread under the hammer more than any other *Metall*; it is beaten into leaves exceeding fine, for the use of *Gilders*; and to be used occasionally in *Physick*; they will easily mix in compositions, and with powders.

Covetousness that has always prevailed on the minds of mankind has not left the *Chymists* without continual hopes of making *Gold* by their Art, they have conceited that the production of *Gold* was the *End* that *Nature* always aims at in all her *Mines*, and that she's *hindred* in her design, as oft as she produces other *Metals* which are called *Imperfect*.

And upon this fancy they have spared no time, nor pains, nor cost, in exalting and perfecting these other *Metals*, and turning them into *Gold*; this is that which they call the *Grand Operation* of all, or the search after the *Philosophers stone*.

Some of them to compass their *end* do make a mixture of these metals with such other matters as serve to purifie them from their grosser parts, and work their *Preparations* with great fires, others do put them a *Digesting* in *Spirituons* liquors, in imitation of *Nature* that always uses a gentle Heat in her Operations, and so do reduce them into a state of *Corruption*, to draw thereby their *Mercury*, which they think to have the aptest disposition to make *Gold*. Others again do search after the *seed* of *Gold*, in *Gold* it self, and these make no doubt to find it there, as the *seed* of a *Vegetable* is more likely to be found in the *Vegetable* it self

E than

than otherwhere; in order to this they open the body of *Gold* by proper *Dissolvents*, then set it a *digesting* either by a *Lamp-fire*, or the *heat* of the *Sun*, or that of *Dung*, or some other degree of *Fire*, to be kept all along at an equal height, and such as is nearest to a *Natural* heat, and this to draw out the *Mercury* of *Gold*; for they are perswaded that if they could once obtain this same *Mercury*, sowing it in the *Earth*, it would bring forth *Gold*, as certainly as a *seed* does a *Plant*.

Another sort of these men do take wonderful pains to find out the *seed* of *Gold* in *Minerals*, as in *Antimony* for example, thinking there's a *sulphur* and *Mercury* in it as like to those in *Gold* as can be. Others hope to find it out in *Vegetables*, and things that come from them, as in *Honey*, *Manna*, *Sugar*, *Wine*, *Rosa solis*, *Rosemary*, *Spleenwort*. And others pursue after it in *Animals*, and in their *Gums*, *Bloud*, *Urin*. But the most Curious and delicate of all, who think all the rest but Fools in comparison with them, do hunt after the *seed* of *Gold* in the *Sun*, and in the *Dew*; for the wisdom of *Astrologers* has found out that the *Sun* is a Body all of *Gold* melted in the Center of the *World*, and *Coppel'd* by the fire of the *stars* that environ it about; nay they dare affirm that this same *Gold* when it was a purifying did sparkle as *Gold* does in the *Coppel*.

I should never make an end of this subject, if I should speak of the labours, and pains, watchings, vexations and frettings, and especially the cost these unfortunate men do plunge themselves into, in following their several fancies; they are fo
extremely

extremely prepossessed with the conceit of becoming *Rich* all of a sudden, that they are altogether incapable of any sober admonition, and they shut their ears to any thing that can be said to disabuse them; so that all other *Philosophers*, that are not besotted with their fantastical opinions, are by them thought and called *Prophane*, reserving to themselves the name of the only *True Philosophers*, or *Philosophers paramount*.

But the saddest consideration of all is, to see a great many of them, who have spent all the flower of their years, in this desperate concern, in which nevertheless they pertinaciously run on, and consume all they have, at last instead of recompence for their miserable fatigues, reduced to the lowest degree of poverty. *Penotus* will serve us for an instance of this nature, among thousands of others, he died a hundred years old wanting but two, in the *Hospital* of *Tverdon* in *Switzerland*, and he used to say before he died, having spent his whole life in vainly searching after the *Philosophers stone*, that if he had a mortal Enemy he did not dare to encounter openly, he would advise him above all things to give up himself to the Study and Practice of *Alchymy*.

This man did indeed at last perceive his error and folly, and did acknowledge that he had spent his time most unfortunately and idly; but there are few men who prove so ingenuous as to do so; for they think that their honour is concerned in maintaining whatever error they have once openly defended, and they are quite ashamed to have it believed, that they had laboured in vain so long, and spent their substance in an en-

terprize that had not good probability of success.

Many of them to avoid such reproaches, and to make the world believe that they have found out some realities, and especially to engage some particular person, they have designs upon, to joyn with them in the pursuit of their projects, have contrived a great many cheating *Legerdemain* tricks, some with the pretended *Powder of Projection*, others with their *Aurum Potabile*, some by fixing *Mercury* with *Copper*, or *Verdegrees*, lastly others with *Cinnaber*, which they turn into *Silver*.

They say for themselves that their *Powder of Projection* is the *Seed of Gold* it self, which *seed* has the faculty of multiplying or encreasing the *Gold*, when some small quantity of it is used. And to give a proof of their skill, they put some *melted Gold* over the fire, then they cast a little of their *powder* into it, they stir about the matter with a rod of *iron*, or some other *metal*, then they cast their *Gold* into an *iron mold*, and it proves to have received a considerable augmentation. At first this Experiment surprizes strangely the spectators, and they are ready to cry out, a Miracle; a Miracle. Then some are greedy to buy this *Powder of Projection*, but the Artist will not part with it, unless he is paid dearly for it. The purchaser thinks he has now got the Bird sure in the nest, he runs in haste home to make *multiplication* of his *Gold*, he melts it, sings in the *powder*, stirs the matter about, lastly, he observes the same circumstances he had seen observed before, but at last finds that his *Gold* has made no increase of

of its weight. Then he thinks he failed in some thing that was to have been done, and so begins the Operation again, once, or twice, but all in vain, he poor man can make no Augmentation, and finds too late that he has been wretchedly imposed upon. Now the mystery of this egregious knavery was thus :

He that stirs the matter, is privately provided with several small pieces of *Gold*, to convey dextrously into the *Crucible*, or *Coppel*, at different times, so cunningly that none of the Assistants does at all perceive it ; but when he finds that he is too narrowly observed, and foresees that it will be too hard for him to slip in any more *Gold* to that which is melted, without being discovered, he then takes a rod of *iron* or *copper*, in the end of which he has inlaid *Gold* so as it may not be discovered, and then stirs about the melted *Gold* with this artificial rod. The *copper* or *iron* melts, and with it the other *Gold* mixes with the rest, and so makes an *Augmentation*. Now if any body demands what is become of the end of the rod, he answers as plainly enough appears, that it is separated into dross, for *copper* cannot mix with the body of *Gold*. And if we should examine further into the *Powder of Projection*, we should find that it is only *Quick-silver* in *Powder*, or some such matter, that consumes away by the heat of the fire, or else turns into dross.

Their *Aurum Potabile* which they crack with so loud, and which they sell at so dear a price, is commonly nothing else but a tincture of some *Vegetable* or *Mineral*, whose colour comes near to that of *Gold*, and because this *Tincture* is pre-

pared with some spirituous *Menstruum*, it sometimes causes a *breathing sweat*. Now this *diaphoretick* effect they never fail to attribute unto *Gold*, which yet generally is no occasion of it. This same cheat of theirs is none of the least that they use to get by, for in point of Medicines, abundance of people prove extreme credulous, and especially when an *Universal medicine* is talk'd of, such as they pretend their *Aurum Potabile* to be. Now I shall shew in the sequel, that the business of *Aurum Potabile* is in reality a mere *Chimera*.

They prepare their *Mercury* by fixing its body with *Verdegrees*, and thus they prepare a matter that comes very near to the colour of *Gold*; for the *Verdegrees*, which is a kind of *Copper* does give the *Mercury* a yellow colour, and for fear it should not be coloured high enough to their purpose, they colour it with *Turmerick*, or some such thing of the like quality: and now they will needs persuade the world that they have performed the feat, even of making *Gold*; but if a man will never so little examine this pretended *Gold* by the *Coppel*, the whole flies away in fumes, as *quicksilver* does commonly use to do. Now if after such trial a man tells them, that their *Gold* is all gone into the air, they answer for themselves, that indeed this *Gold* had not received its last *Fixation*, but that the main business of it being thus atchieved, they make no doubt by working a little longer upon it they shall soon find out the way of fixing it wholly, and bringing it to its last perfection.

But again, if they could fix their matter so as to make it resist and undergo the *Coppel* (which is a thing in a manner impossible) still they would
not

not be able to maintain their Assertion that they had *made Gold*; for there are several other *trials* that their matter must be able to pass, such as the dissolution by *Aqua Regalis*, the *Depart*, the being *malleable*, the *weight* of its substance, without all which qualifications it can never be properly called *Gold*.

Moreover they have a way of turning *Cinnaber* into *Silver*, and this contrivance is full of curiosity. And thus they use to do it:

They stratifie *Cinnaber* grossly bruised in a *Crucible*, with *Silver* in grains: they set the *Crucible* in a great fire, and after some time for its *Calcination* they take it off, and pour the matter into a bason, and then they shew the *Cinnaber*, pretending it to be turn'd into *true Silver*, although the foresaid grains do remain in the form they had before. Hence they conclude the possibility of *Transmutation of metals*, because the *Mercury* of the *Cinnaber* is turned into *Silver*, whereas the *Silver* did remain as it was before.

This Experiment amazes people much, and it is hard to see those same pieces of *Cinnaber*, which were put into the *Crucible* before them, chang'd from *Mercury* into *pure silver*, without inclining to believe an *Augmentation* of this last *metal*; nay, many conclude that there remains no longer doubt of it. And men continue possess'd with this error, until some body has the curiosity of examining the *granulated silver*, and then the abuse begins to be discovered, for it is found to be exceeding light, and if it be prest between the hands, it crushes in pieces as easily as *membranes*. The *Augmentation* comes to be no longer believ'd,

when the grained pellicles are weighed with the pieces of *Cinnaber*, for the whole weighs no more than the *silver* in grain did before it was put into the *Crucible*. Lastly, it must of necessity happen (which appears very strange) that the *Mercury* does first *Amalgamate* with the *silver*, that it conveys this *silver* into the pieces of *Cinnaber*, and then being evaporated over the fire, it leaves the *silver* all alone.

I could here relate divers other subtle inventions of *Alchymists*, by which they too often impose on such as have plenty of money, to make them become fellow-partners with them in their Operations; but I should prove too tedious on this subject, I have only toucht upon them by the by, in order to disabuse such men as are prepossessed with an opinion of the *Transmutation of metals*.

Although I cannot absolutely deny, but that some certain Artift, by a particular method, might have got the way of making *Gold* heretofore, nor that some body may be as lucky in time to come; yet there is more appearance of *Impossibility* than *possibility* in the case, because of the small knowledge that any of us have of the *Natural Composition* of this *mixt*; for seeing that *Gold* as well as *Silver* is drawn from *Mines* environed with *Waters*, it is very probable that these *Waters* do bring along with them some *Saline Principles* that congele and incorporate in Earths of a particular composition, and whose Pores are disposed in such a manner as 'tis impossible for *Art* to imitate. Nevertheless in order to make *Gold*, a perfect knowledge of the *Salts* that the *Waters* of the *Mines* do convey, is very requisite as well as the dispo-

disposition of the *Matrixes* or *Earths* in which they do congele. Wherefore a man must be soundly prejudiced, before he can believe that by the help of *artificial fires*, he can concoct *metals* so as to turn them into *Gold*.

As for the *Mercury* which men pretend to draw out of *Minerals* and *Metals*, and which they believe to be the *seminal principle* of *Gold*, it is a thing meerly imaginary; for first of all, it is a great question and may be doubted, whether there be any *Mercury* in those *metallick* matters where-in it is sought after, but if we should suppose it in them, what reason shall we have to make it be the *seed of Gold*? we can no ways find that *Mercury* is able to produce *Gold*, nay further, as I said before, the growth of *metals* and *minerals* is quite of another nature than that of *Vegetables*.

Now say they, the *seed of Gold* is communicated unto all bodies, and that it does abound in the Universal Spirit. And because *Manna*, *Dew*, *Hony*, are impregnated with this Spirit, that *Gold* may by Art be drawn out of those substances.

We grant unto them, that the Universal Spirit does contain an *Acid* which serves towards the production of *Gold*, because the *acid waters* or *salts* which do enter into the composition of this *metal*, do proceed from the Universal Spirit; but if you go to call this *acid* a *seed*, it will prove to be the *seed* of all other *mixt* bodies as well as that of *Gold*, and there's no more reason for thinking that the Universal Spirit does abound in the *seed* of *Gold*, than in the *seed* of the grossest *metal*, or the most unuseful *plant*, or the most contemptible of *animals*; so that we may conclude, that to spend
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ones time in making of *Gold*, seems properly to lose it by working in the dark, and I find that *Alchymy* has been very well defined to be, *Ars sine arte, cujus principium mentiri, medium laborare, & finis mendicare*, an Art without any Art, whose beginning is Lying, whose middle is nothing but Labour, and whose end is Beggery.

Gold is a good Remedy for those who have taken too much *Mercury*; for these two Metals do easily unite together, and by this union or *Amalgamation* the *Mercury* fixes, and its motion is interrupted. This is plainly enough perceived in such as have received the Frictions with *Mercury*; for if they do but hold a piece of *Gold* in their mouth a little, it will grow white by the vapour of the *Quicksilver*.

Gold taken inwardly is thought to be a most potent *Cordial*, because *Astrologers* tell us it receives its Influence from the *Sun*, which is as it were the *Heart* of the world, and by the communication of those Influences to the heart, it serves to fortifie and cleanse it from all impurities; upon which ground a great many Operations have been invented in order to open this *Metal*, and separate its *Sulphur* from its *salt*. Moreover this Operation by way of bravery is called *Aurum Potabile*, because this *salt* or this *Sulphur* dissolving in a Liquor, can be taken by way of *Potion*: And because this *Aurum Potabile* can be thought to be distributed into all parts of the body, they fancy it can drive out every thing that interrupts the Functions of Nature, that it can free him that takes it from all fear of any Diseases for a long time, and can prolong life.

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But this Opinion is built upon a weak foundation, and Experience does not confirm any of these glorious effects; for what assurance can we have, or what Evidence is there, that the *Sun* is such a great friend of *Gold*, or that it bestows more *Influence* on it, than on other mixt bodies; it is a thing that can never be prov'd, and we see that the *Sun* casts its light and heat in general upon all bodies, without making any difference. Who can understand, that the *Pores* of *Gold* are so disposed, as to have a greater facility of retaining the *Suns Influences*, than other *metals* or things? This will be full as hard to prove as the other.

But though we should grant *Astrologers* this supposition concerning the *Suns Influence* on *Gold*, the consequence they draw from it, that therefore it *Fortifies* the *heart*, would be ne're a-whit the truer; for all that we are able to apprehend in *Gold* is, that it is a most compact and weighty body, the union of whose *Principles* is extraordinary close; which is proved from hence, that no Art can instruct us to dissolve it *Radically*, so as to separate its *salt*, and its *sulphur*. This *Gold* being beaten into the thinnest *Leaves* that can be imagined, and taken inwardly receives not the least change in our bodies, and is voided the very same it was before, excepting when *Quicksilver* has been taken beforehand, for it unites with that, as I have said.

Wherefore we must conclude, that if *Gold* has received more *Influence* from the *Sun* than other *Metals*, yet it is never the fitter to dissolve in our Bodies, nor to produce those rare effects that are talkt of.

I know that stories are told to prove, that *Gold* does communicate virtue to the bodies of those who have taken it, and that it loses in the body some of its quantity; and among other stories 'tis said, that several persons, who had fed upon *Capons*, nourished with a *Paste* made of a mixture of *Vipers* flesh and *Gold* together, have been cured that way of several *Diseases*; but there's a great deal more reason to attribute this effect rather to the *Vipers* than *Gold*; for we know by experience, that *Vipers* taken inwardly without any thing else, do use to produce divers sensible effects, whereas we observe none at all in *Gold*, when 'tis given alone.

As for the diminution they imagine of *Gold* in bodies, they prove it by their gathering together all the *Excrements* of those *Capons*, and *Calcining* them, for they could obtain again but the fourth part of the *Gold* that was used in the *Paste* the *Capons* had fed upon. But this proof is as weak as the former; for the *Excrements* of the *Capons* being full of a *Volatile Salt*, that *Salt* may have *Volatiliz'd* and carried away the greatest part of the *Gold* during the *Calcination*, after the same manner as we see several *Volatile* liquors to *sublime Gold*. I know well enough by my own Experience, that there are such *Volatiles* as are able to *sublime Gold*; for having one day mixed three ounces of *Gold* with about three pounds of matter consisting of divers *Volatile ingredients*, I put the mixture about a month afterwards into the *Coppel*, and the *Gold* appeared very resplendent in the middle of the mixture; but blowing, as we use to do, in its purification, I was astonished to see it *Exalt* away by little and little into the *air*, until there was not a grain of it left.

Thus

Thus no body can be assured that *Gold* did nourish those *Capons*; but besides, though some of it should be dissolved in the body, as it does in *Aqua Regalis*, which is very hard to conceive; though some of it should *exalt*, nay though some should plainly glitter in the *Chyle*, here's no proof nevertheless that it produces such wonderful effects.

Now although I have asserted that *Gold* taken alone does not receive any change as for health, yet I value very much several preparations of *Gold* made with *Spirits*; for 'tis these *Spirits* that give certain determinations to *Gold* according to their nature, and make it operate as it does. When I speak of *Aurum Fulminans*, I shall give an instance of what I now say.

Purification of Gold.

To *Purifie Gold* is to separate from it the other *Metals* which are mixed with it.

Put as much *Gold* as you please into a Crucible, make it red hot, and when it begins to melt, cast into it four times as much Antimony in powder, the *Gold* will presently melt; continue a strong Fire, until you perceive the Matter to sparkle.

Then take your Crucible out of the Fire and knock it, that the *Regule* may fall to the bottom. Break it when it is cold, and separate the *Regule* from the dross that remains a top of it. If you have a mind to save your Crucible, pour out the matter that lies in Fusion into an Iron Mortar made like a Founders Mould, which you shall have heated a little and greased before-hand, then strike about
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the Mortar with pincers, till the matter settles in a Mass.

Let this Mass cool a little, then flinging it out, separate the *Golden Regule* from the dross. Weigh this *Regule*, melt it again in a Crucible over a strong Fire, and when it shall come to melt, throw into it by little and little three times as much *Salt-peter* : continue a good strong Fire, that the matter may remain in Fusion, and when the Fumes are all gone, and it appears clear and clean, cast it into your Iron Mortar warm'd and greas'd as I said but now, or else leave it in the Crucible that you shall beat while it is cooling, for the separation of the *Regule* from the Dross that remains a top, and your *Golden Regule* will prove perfectly pure.

Remarks.

The ordinary way of *purifying* Gold is the *Coppel*, in which the same method is used that I shall speak of in the *Purification* of Silver. But the *Coppel* not being able to separate Silver from Gold, recourse is had to another Operation, that is called the *Depart*.

Melt three parts of Silver with one part of Gold, in a Crucible over a good Fire, and when this mixture is in Fusion, cast it into cold water, and it condenses into *Grains*, which being dried, a separation of the Silver from the Gold is made by the means of *Aqua fortis* ; for this *Menstruum* dissolves Silver very well, but the Gold remains in powder at the bottom of the Vessel, for the reason

reason that I shall relate in the Chapter of *Aqua Regalis*. The Dissolution of Silver is poured off by Inclination, then the Powder of Gold is washed to be made sweet.

But it often happens that some particles of the Silver do still remain united with the Gold, so that this Purification cannot be said to be altogether perfect.

There is another method of *Purifying Gold*, to wit, *Cementation*, which is thus performed.

Stratise in a Crucible thin plates of Gold, with a dry paste, that is called *Cement*, in which the Salts *Gemma* and *Armoniack* do enter; cover the Crucible, and having made a fire round about it, Calcine the matter for ten or twelve hours with a violent heat, that the *Salts* may eat and consume the impurities of the Gold: but nevertheless they often leave it still impregnated with other Metals.

The *Purification* of Gold by the means of *Antimony* is better than any other; for there is nothing but Gold that is able to make resistance against this devourer; it often eats some portion of it, but never leaves it in any other Metal.

You must remember to lay a Tile under the Crucible, for fear that the air which comes by the Ash-hole, should happen to cool the bottom of the Crucible.

Gold presently melts as soon as *Antimony* is cast into the Crucible, by reason that *Antimony* contains some Saline Sulphurs, which do encrease the force of the Fire, and do separate the parts of this Metal; it is then that the more porous and volatile part uniting with the *Antimony*, one part evaporates away in Smoke, and the other remains fixt in the Dross. The

The sparkles which toward the end do fly out of the matter do proceed from some Particles of *Antimony*, which finding themselves intangled in the Gold do use violence to get out.

Then take your matter off the Fire that it may lose none of its substance, and pour it into an Iron Mortar as I said before. After this the *Regule* is melted once more, and *Salt-peter* cast into it to absorb or receive all the *Antimony* that may yet remain, and so by this means you have a *Regule* as well purified as may be, and even that of four and twenty *Caratts*, if there be any such Gold.

A *Carat* of Gold is properly the weight of one Scruple, or four and twenty grains, and four and twenty *Caratts* make an ounce.

If you take an ounce of *Gold*, and find that it loses not a jot in the *Purifications* that may be made of it, this is called *Gold* of four and twenty *Caratts*; if it be found to have diminished but one *Caratt*, then it is said to be *Gold* of three and twenty *Caratts*; if it loses two *Caratts*, then it is *Gold* of two and twenty *Caratts*, and so of the rest. But it is commonly held that there is no such thing to be found as *Gold* of four and twenty *Caratts*, because there is none but contains some small proportion of *Silver*, or *Copper*, purifie it as much as you will.

Red Gold is the less valuable, because it contains the more *Copper*, which gives it this colour; the *Yellow* is the better, and it ought to remain *Yellow*, even whilst it is in the fire.

A *Caratt* of *Pearls*, *Diamonds*, and other precious stones, is but four grains.

Amal-

Amalgamation of Gold with Mercury, and its reduction into an impalpable Powder.

To *Amalgamate* Gold is to mix it with *Quicksilver*.

Take a Drachm of the *Regule* of Gold, beat it into very thin little Plates, which you must heat in a Crucible red hot in a large Fire; then pour upon it an ounce of *Quicksilver* revived from *Cinnaber*, as I shall shew hereafter; stir the matter with a little Iron-rod, and when you find it begin to raise a fume which quickly happens, cast your mixture into an Earthen Pan fill'd with Water, it will coagulate, and become tractable; wash it several times to take away its blackness; thus you have an *Amalgame*, from which you must separate the *Mercury* that you find not united, by pressing it a little between your fingers in a linnen cloth. The Gold retains about thrice its weight in *Mercury*.

Now to reduce this Gold into Powder, you must put this *Amalgame* into a Crucible over a gentle fire, the *Mercury* will evaporate into the Air, and leave the Gold at bottom in an *impalpable Powder*.

Remarks.

Mercury doth easily penetrate Gold, and insinuating into its Pores makes a soft matter that is called *Amalgame*; it doth the same with other Me-

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talstoo, except Iron and Copper, which are too ill digested to receive its impression.

The *Amalgamation* of Gold is useful to Gilders, for so it is easily extended upon their works.

Aurum Fulminans, called Saffron of Gold.

This Operation is a *Gold* impregnated with some Spirits, which cause it to give a loud crack, when it is set over the Fire.

Take what quantity you please of Gold beaten into thin plates, put it into a Viol, or Matrafs, and pour upon it by little and little three or four times as much *Aqua Regalis* compounded after the manner I shall shew in its proper place. Set the Matrafs upon Sand a little heated, until the *Aqua Regalis* has dissolved as much of the Gold as it is able to contain, which you will know by the ceasing of the ebullitions, pour your solution into a Glafs-vessel of five or six times as much common Water. Afterwards drop into this mixture by degrees the Volatile Spirit of Salt Armoniack, or the Oyl of Tartar made by *Deliquium* or Solution, you'l find the Gold precipitate to the bottom of the Glafs. Let it alone a good while to settle, that all the Gold may fall down, then pouring off the Water by Inclination wash your powder with warm Water, till it grows insipid, and so dry it in Paper at a gentle fire, because it is apt to fire, and the Powder would fly away with a terrible noise.

If you use one drachm of Gold, you will obtain four scruples of *Aurum Fulminans* well dried.

Aurum

Aurum Fulminans causes sweat, and drives out ill humors by Transpiration. It may be given in the Small Pox from two to six grains in a Lozenge, or Electuary. It stops Vomiting, and is also good to moderate the activity of Mercury.

Remarks.

The Plates of Gold are made use of in this Operation, that its dissolution may be more easily performed.

You must pour the *Aqua Regalis* by little and little, to avoid the great effervescency that might be able to drive it out of the Matrafs. The effervescency proceeds from the violent division of the particles of Gold by the *Aqua Regalis*; for when it finds no more bodies to act upon, having divided the Gold into as many parts as 'tis possible, the ebullition ceases, and though the Gold doth all remain in the *Aqua Regalis*, it becomes so imperceptible to us, as it seems the Water hath not changed from what it was before, it appears so very clear and transparent. Indeed the solution has received a Golden colour, and becomes yellow.

The dissolution of Gold is a suspension of this metal in Phlegm, made by the edges of *Aqua Regalis*. For it is not enough that the *Aqua Regalis* does divide the Gold into subtle parts, but it is further requisite that its edges do hold up the Gold, as if it were like so many Finns, otherwise it would always fall to the bottom in a powder, though it were never so subtle.

Now 'tis objected that the particles of Gold should fall to the bottom of the liquor, because they being joined to the points of the *Aqua Regalis* they are become more heavy than they were before; for the union or adhesion of two bodies does cause a greater weight, than when the two bodies were separated one from the other.

I answer, that we ought to conceive the particles of Gold being suspended or held up in the Phlegm by the *acid* points, much after the manner as we do conceive very well, that a small piece of metal fixed to a staff or a plank, will swim with the wood in the water; for although the small piece of metal sinks to the bottom when it is alone, yet it swims when it is affixed to the wood; the *acid* edges are bodies exceeding light in comparison with the particles of Gold, and they have likewise their superficies, more extended, and consequently do take up more room in the phlegm; this is that which holds them up, and causes them to swim.

The Oyl of Tartar, or the Spirit of Salt Armoniack is used for the Precipitation of Gold, because both those Liquors do contain an Alkali Salt, which being mixed with Acids must cause a Fermentation. Now in this Fermentation the parts of *Aqua Regalis* that held up the particles of Gold do grow weak, and having no more force to retain them longer, they must needs precipitate by their own weight.

Perhaps some may find a difficulty in comprehending how the Volatile Spirit of Salt Armoniack should come to weaken the *Aqua Regalis*, that is self compounded of Salt Armoniack; but there

there will be no difficulty at all, when they shall consider that the force of the *Aqua Regalis* doth not so much depend on the volatile part of the Salt Armoniack, as on the Sea-salt, that is in good store in it united with the *Aqua Fortis*; for Sea-salt, or *Sal Gemma* may be substituted very well in the place of Salt Armoniack for making *Aqua Regalis*, as I shall observe hereafter, speaking of the composition of this Water. It may be also enquired here, why the Dissolvents do quit the bodies they held before in Dissolution, to betake themselves to some other: for example, why the *Aqua Regalis* leaves the Gold it was impregnated with, to give way to the Alkali Salt. This question is one of the most difficult to resolve well; of any in Natural Philosophy.

Nevertheless, I'll give you my opinion of what can be said most sensibly on this Subject.

I do suppose that when the *Aqua Regalis* hath acted upon the Gold, so as to dissolve it, the points or edges that enabled it to do so, are fixed in the particles of Gold. But seeing that these little bodies are very hard, and consequently hard to penetrate, these points do enter but very superficially, yet far enough to suspend the particles of Gold, and hinder them from precipitating. Wherefore if you would add never so much Gold, more, when these points have seized upon as much as they are able to joyn with, they cannot possibly dissolve one grain more; and it is this suspension that renders the particles of Gold imperceptible. But now if you add some body that by its motion and figure is able to engage the *acids* enough to break them, the particles of Gold being left at liberty

liberty will precipitate by their own weight. And this is what I conceive the Oyl of Tartar, and Volatile Alkali Spirits are able to do. They are impregnated with very Active Salts, which finding bodies at rest do presently move them, and by the quickness of their motion do shake them so violently, as to break the points by which they were suspended; these fragments of little points being thus disengaged from the Gold, are still keen enough to act, and they have action enough remaining to pierce and divide violently the parts of Alkali Salts, which are much more soluble in their nature than Gold, and this occasions the Ebullition which presently happens when these Spirits are poured upon the Dissolution.

These edges then being thus broken, two things must follow thereupon. The first is that the remaining *Aqua Regalis* is rendred incapable of dissolving any more Gold, because it hath no more power left of making a penetration. The second is, that the precipitated Powder of Gold is impregnated with some part of the Dissolvent, by reason that the sharpest part of these edges remains within it.

Experience teaches us both the one and the other: to wit, the force of the *Aqua Regalis* is quite destroyed for dissolving any more Gold, and the precipitated Powder hath drawn along with it some Spirits that are so closely lockt up, that though it be several times washt in warm Water, they cannot possibly be disengaged from their hold. And this is evident, when it is put upon the Fire; for the great Detonation, or noise that it makes, cannot proceed from any thing else, but the inclosed

closed Spirits which violently divide the most compact body of Gold to get out quickly, when they are forced to it by the action of Fire.

I can here explicate by the by, after the same manner, the action of a certain Powder, consisting of three parts of Niter, two parts of Salt of Tartar, and one part of Sulphur. This Powder being heated in a Spoon to the weight of a Drachm, gives as Thundering a noise as a Cannon it self. Now the fixt Salt of Tartar causes in this Powder what the Gold did in the other; that is to say, it retains the Spirits of Niter and Sulphur so lockt up, that they cannot be separated without violently breaking their Prison; and this is that which makes such a noise.

Aurum Fulminans taken inwardly causes sweat, because the heat of the Body volatilises it, and drives it through the Pores. Now if the Pores are very open, it will only cause an insensible transpiration: but if they are closed up by the coldness of the weather, so that it must remain some time before it passes; the vaporous humidity which bears it company, dissolves upon the skin into what we call sweat.

Some think the Gold contributes nothing at all to these transpirations, and that the spirit of Niter alone being forced by the heat of the body to pass through its Pores causes all the action. But I conceive it is more likely that these spirits do carry along with them some parts of the Gold, with which they are so intimately mixed. And by this explication may be better comprehended, how so small a quantity of spirits is able to produce sweat; for suppose there passes through the

Pores one grain of Gold, and two grains of spirits, these spirits being as I may so say, armed with the grosser parts of Gold, will be better able to conquer the resistance that shall oppose their passage, than if they were separate; after the same manner as a good piece of Timber that is driven along by the stream of a River will strike with much more violence against the Arch of a Bridge, and endanger it much more, than a single Wave would be able to do, though never so swift.

There are two sorts of insensible Transpirations, one hapening at all times, as well in health as sickness, and the other in a Burning Fever, or else sometimes upon the taking a *Sudorifick*.

The first Transpiration is insensible, because the vapour which passes continually through the pores is yet in so small a quantity, that though it does dissolve in a moisture upon the skin, it is not perceived at all.

The other is caused by a great motion of the Spirits which drive the humours through the pores of the body after a rapid manner, and whereas at that time the pores become very open, and the skin is heated more than ordinarily, the vapour passes away through the skin without condensing upon it.

But if once the rapid motion of humours begins to slacken, then the sweat appears, and begins to be felt; and this does happen in *Agues*, for during the great heat of the *Ague*, men do not sweat at all, but only in the declination of the fit; because then the skin somewhat cools, the vapour condenses into a moisture, which we call sweat; wherefore sweat may be said to issue from a middle degree of heat, between the first insensible Transpiration, and the second.

Most

Most men think that there goes out more moisture in the time of the sweat, than by the insensible Transpiration which is made during the height of the hot fit; but they seem to be mistaken very likely, for it may easily be conceived, that there should be a greater disposition in the vigour of the fit, than afterwards in the declination, by reason that at that time the heat is greater, and so more able to impel forth *effluvia*.

Distillation in a Retort will confirm what is here maintained. For if you make only a moderate fire under the Retort, the moisture which rises out of the matter will distil drop by drop, because the vapours cooling and condensing in the neck of the Retort do resolve into a liquor; but if you make a great fire in the Furnace, so that the neck of the Retort comes to be heated too much, all the moisture is driven in a meer vapour, and there appears not the least humidity in the neck of the Retort.

I have already said, that Gold doth repress the violence of Mercury, because it doth *Amalgamate* with it; but *Aurum Fulminans* doth it much better, for being Volatile it is more easily carried through all the body, and fails not to find out the Mercury, wheresoever it lies.

We need not fear lest *Aurum Fulminans* taken inwardly, and heated by the stomach, should cause such a *Detonation* there, as it does when set over the fire in a spoon; for so much the more moisture as comes to it, so much the less noise does it make. Now it can't be question'd, but there is liquidity enough in the *stomach*, besides the liquid vehicle 'tis usually given in. There is no need then

then of calling in the *acids* of the stomach, as some do, to unite with the *salts* of *Aurum Fulminans*, and drive them out of the body of this Metal: for besides that the most clear and disinterested Explications and such as fall most under our sense, ought always to be preferr'd, 'twould be too hard a matter to maintain that; 'tis true if you wet *Aurum Fulminans* with the *spirit of Vitriol*, or *Salt*, or *Sulphur*, the *Fulmination* is thereby hindred; but this happens from the *acids* fixing by their weight the *Volatility* of those *Salts* that remain in the pores of the *Gold*.

In the Chapter of *Gold* I could reckon up several other Preparations that have been invented, but because they are out of use, I shall not swell this Book with an account of them.

CH A P. II.

Of Silver.

S*ilver* hath the second place among Metals, it is a very compact body, more smooth and polished by nature than *Gold*, and its Pores are more even upon the surface. it is malleable like *Gold*, but will not so easily yield or extend under the Hammer, and is not so weighty.

It is called the *Moon*, as well from its Colour, as from the Influences our Forefathers thought it received

received from the *Moon*. Many properties are attributed to it against Diseases of the Head; but these pretended Virtues seem to have no other foundation than the imagination of Astrologers and Chymists, who were of the opinion that the *Moon* had a great deal of correspondence with the *Head*. There is no need I should enlarge in confutation of this opinion, experience every day teaches us that it is a pure abuse.

Silver may be also given like *Gold* for Diseases caused by too much *Mercury*; for they suffer an *Amalgation* very well together.

Whereas there is no certainty, that ever there was drawn out of *Gold* or *Silver* any thing that deserves to be called either a *Salt*, or *Sulphur*, or *Mercury*, I have not at all followed the method of Authors, who will needs explicate the differences which are to be found in these Metals, by more or less, of one or two of these Principles. I am contented to relate only that which may be known in *Gold* and *Silver*, and I think it better to say little of a thing, and be able to prove my assertion, than form grand Ideas of things that are very doubtful.

Purification of Silver.

To *Purify Silver* is to separate from it the other metals with which it is mixed. This operation is done by the *Coppel* after the manner following:

Take a *Coppel* made of the ashes of Bones or Horns, cover it and heat it gently in the coals, until it grows red-hot, then cast it into four or five

five times as much *Lead* as you intend to purifie *Silver*: let the *Lead* melt, and fill the sides of the Coppel, which is soon done; then cast your *Silver* into the middle, and it will presently melt. Lay wood round about the Coppel, and blow it that the flame may reverberate on the matter, the impurities will mix with the *Lead*, and the *Silver* remain pure and clean in the middle of the Coppel, while the *Lead* being fill'd with the drossie parts of *Silver* lies on the sides like a scumm, that you may gather up with a spoon, and this is that which is called *Litharge*, which according to the degree of Calcination it hath endured, becomes of divers Colours, and sometimes is called *Litharge of Gold*, and sometimes *Litharge of Silver*. If you leave it in the Coppel, it will pass through its Pores.

For you must observe that the Coppel being expressly made of ashes deprived of *Salt*, is very Porous; you must continue the Fire till there rise no more Fumes.

This Preparation cleanses *Silver* from all other Metals, except *Gold*, which resists the power of the Coppel. You must therefore have recourse to the Operation I described, when I spoke of the Purification of *Gold*; for *Aqua fortis* dissolves *Silver*, but not being able to penetrate *Gold*, leaves it in a powder at the bottom.

Pour off then by Inclination the dissolution of *Silver* into an Earthen pan, wherein you shall have laid before-hand a plate of Copper, and ten or twelve times as much common Water. Let this mixture lie still for some hours, and when you find the Copper covered all about with the Powder or Precipitate of *Silver*, and the water becomes blue,

blue, Filtrate it, and you have that which is called *Aqua Secunda*: It is good to make the Eschar fall in Chancres, and to consume proud flesh. Dry the powder of *Silver*, and if you desire to keep it in an *Ingot*, melt it in a Crucible with a little *Salt-peter*.

If you steep a plate of Iron some hours in the *Aqua Secunda*, the Copper which made it look blue will precipitate according as the Iron dissolves. If you Filtrate this dissolution, and put a piece of the *Lapis Calaminaris* into it, the dissolved Iron will fall to the bottom in powder, and the Stone will dissolve it. If you Filtrate this water, and pour upon the Filtration drop by drop the water of fixt *Niter*, the *Lapis Calaminaris* will precipitate. Lastly, if you Filtrate this water too, and having evaporated a part of it, set the rest a CrySTALLIZING, you'll meet with a *Salt-peter* that burns like the ordinary fort.

Remarks.

The Coppel is an Earthen Vessel that resists the Fire, made like a dish: it is fill'd with a Paste made of ashes that have lost all their Salt, such as those of Bones; which lose all their Salt while they are a burning, because it is so Volatile: a hole is made in the middle to let in the matter that is to be Coppel'd, and so the Vessel is set a drying.

You must put *Lead* into the Coppel, in proportion to the impurities that are in the *Silver*; commonly they put four times as much. That which is here called Impurity is nothing else but some parts

parts of other Metals, that superficially adhered to the *Silver*, when it was taken out of the Mine. These Metals do mix much better with *Lead* than *Silver*, because the *Lead* is full of Sulphureous porous parts which readily engage and receive other Bodies. On the contrary *Silver* hath Pores exceeding close and strait, and can neither be penetrated nor unite with these Matters but only superficially; so that in the Fusion they do separate and only slide over this Solid body. It is also remarkable that the hardness of *Silver*, and strait contexture of its parts do hinder the Fire from melting it after the same manner as other Metals, that are more porous; and this is the reason it remains unmixt among them.

Silver melts much sooner by being put into melted *Lead*, than if you had endeavour'd to melt it alone in the Crucible, because *Lead* contains many Sulphureous parts that are very serviceable for the Fusion of Metals. The flame is made to Reverberate on the *Silver*, to drive all Heterogeneous substances towards the sides.

That which is called a *Caratt* in *Gold*, is a *Denier*, or penny weight in *Silver*, and thus an ounce of *Silver* well purified is of four and twenty penny weight, which make 24 times 24 grains. Now this ounce of *Silver* must lose nothing at all upon trial; but if it should lose one penny weight in the Coppel, the *Silver* then is said to be that of 23 penny weight, and if it loses two scruples, or penny weight, it is but of 22 *Deniers*, and so of the rest.

There is no *Silver* to be had of 24 *deniers*, no more than *Gold* of 24 *Caratts*, because there is
always

always some mixture with it, use what diligence and application you please in its purification.

Plate-silver contains one part of *Copper* to 24 parts of *Silver*, and the *Coppel-silver* contains but a quarter of a part of *Copper* to four and twenty parts of *Silver*.

The *Depart*, or parting of Metals, is when a Dissolvent quits the Metal it had dissolved, to betake it self unto another. Thus when *Copper* is put into the Dissolution of *Silver*, the *Aqua fortis* leaves the *Silver*, to fall upon Dissolving the *Copper*; and the reason of this is, because the *Copper-particles* do so stir and shake the edges of the Dissolvent, as to make them let go their hold. *Iron* precipitates *Copper*, *Lapis Calaminaris* precipitates *Iron*, and the Liquor of fixt *Niter* doth so to the *Lapis Calaminaris* for the same reason; but you must observe, that *Iron* does not precipitate all the *Copper*, nor the *Calaminaris* all the *Iron*, no more than the *Copper* did precipitate all the *Silver*: and the reason of this is, that the points of the *Aqua fortis* having entred more deeply into the great pores of *Copper* and *Iron*, are much the harder to be broken by bodies of this nature; but because the liquor of fixt *Niter* does contain an Alkali much more active than the others, it precipitates all the *Lapis Calaminaris*, and all the *Iron* and *Copper* which did remain dissolved.

I shall in the sequel of this Book describe the manner of preparing the Liquor of fixt *Niter*: the Salt that it contains reunites with the Volatile Spirits of *Salt-peter* that were in the *Aqua fortis*, infomuch that the *Salt-peter* revives again.

Crystals

Crystals of Silver, called Vitriol of the Moon.

This Operation is a *Silver* opened, and reduced into the form of *Salt* by the *acid* points of *Spirit of Niter*.

Dissolve one or two ounces of *Coppel-silver* in three times as much *Spirit of Niter*; pour forth your dissolution into a *Glass-Cucurbite*, set in a gentle *Sand-fire*; evaporate about the fourth part of the moisture, and so let the rest cool without stirring it, it will turn into *Crystals*, which you must separate from the *Liquor*, and after you have dried them, keep them in a *Viol* well stoppt. You may again fall to *Evaporating* half the remaining *Liquor*, and set it a *Crystallizing* as before. You may repeat these *Evaporations* and *Crystallizations* till all your *Silver* has turned into *Crystals*.

This *Vitriol of the Moon* is used to make an *Eschar* by touching the part with it. It is also given inwardly for *Dropsies*, and for *Diseases* of the *Head*, from two unto six *Grains*, in some *Specifick Water*: it purges gently.

These *Crystals* might be prepared with *Oyl of Vitriol*, instead of *Spirit of Niter*, for inward use.

Remarks.

You must put your *Silver* purified by the *Coppel* into a *Viol* or *Matraß* large enough, and pour upon it only as much *Spirit of Niter* as will serve to Dissolve it; now that comes to about three times

times its weight. Indeed you may use *Aqua fortis* instead of *Spirit of Niter*, if you please, in this Operation; but I rather chuse *Spirit of Niter*, because it is found to act with more celerity than *Aqua fortis*. You may read in their proper places the description I have given you of them both, and the Remarks I have made upon them. Place your Vessel in Ashes or Sand, a little warm for to hasten the Dissolution. When the *acid Spirits* begin to work upon the *Silver*, an Ebullition presently rises accompanied with a very considerable heat, because these sharp edges do break those obstacles that hindred their entrance, and violently force their passage. It is this great motion, and impetuous dispersion of parts, that produces the heat and ebullition, and by rarefaction of the *Spirit of Niter* sends forth through the neck of the Vessel a Red fume or vapour, that you must be very careful to avoid, as a thing very unwholsom, and prejudicial to the Breast. The Smoke and Ebullition do remain until the *Silver* is all of it dissolved, after which the Liquor becomes clear and transparent but a little bluish. If the *Silver* which is dissolved, were perfectly purified from *Copper*, the solution would no more be tinged than *Spirit of Niter*, but because there is none to be found so perfectly pure, it always tinges a little. The solution of *Plate-silver* is much bluer than that of *Silver* purified by the *Coppel*, because the *Plate-silver* contains more *Copper* than the other, as I said before. So that the purer the *Silver* is, the less blue is the solution. A little of it is evaporated, that the rest may *Crystallize* the easier, for that which evaporates is little better than a kind of

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insipid water, the *Silver* still retaining the *Acid fixt Spirits*.

Now you must observe in all Crystallizations not to leave too much moisture, for fear of weakening too much the *Salts*, and so hindring their Coagulation. Nor must you leave too little moisture; for the Crystals not finding room enough to extend themselves in, would confusedly fall one upon another.

These Crystals can be dissolved in Water like Salt, their strength depends on the *Spirits of Niter* that are incorporated with them: wherefore they weigh more than the *Silver* did that was employed; and it is these *Spirits* which pierce and gnaw the flesh on which these Crystals are applied, when an *Eschar* is to be made. It is likewise they which cause that Fermentation of humours by which they purge, when these Crystals are given inwardly. The Liquor in which they are dissolved to be taken, and the moisture of the *Stomach* do serve to correct their *acrimony*.

If you have a mind to revive these *Crystals* into *Silver* again, you must only put them into hot Water, and lay therein a plate of *Copper*. They will then dissolve, and the *Silver* precipitate to the bottom in a White powder, that is to be washed and dried; afterwards melting it in a Crucible with a little *Salt-peter*, it will return into Ingots of the same weight as before.

Infernal Stone, or perpetual Caustick.

The *Infernal stone* is a *Silver* rendred *Caustick* by the Salts of *Spirit of Niter*.

Dissolve in a *Viol* what quantity of *Silver* you please, with three times as much *Spirit of Niter*; set your *Viol* in a *Sand* fire, and evaporate about two thirds of the moisture; pour the rest as it is hot into a good *German Crucible*, that must be large enough by reason of the *Ebullitions* that are made in it. Place it over a gentle fire, and let it alone till the boiling matter sinks quietly to the bottom of the *Crucible*. Then encrease your fire a little; and it will come to be like *Oyl*: pour it out into an *Iron* mould a little oil'd and heated, it will presently coagulate or harden; after which you may keep it in a *Viol* well stopt. It is a *Caustick* that will remain for ever, provided you don't let it be expos'd to the *Air*. This *Stone* may be made of *Copper* instead of *Silver*, but will not keep so well; because the *Copper* being very porous doth suffer the *Air* to enter easily and dissolve it.

If you use an ounce of *Silver*, you'l obtain an ounce and five drachms of the *Infernal stone*.

Remarks.

The Effect of this *Stone* proceeds from the Corrosive *Spirits of Niter*, which do remain incorporated with the *Silver*. It is more *Caustick* than the *Crystals* I now spoke of, though compounded

of the same ingredients. The reason of it is, that in the Evaporation of the *Spirit of Niter*, the sharpest part remains at last; and it is that which gives this strength to the *Infernal stone*. But in the *Crystall* there's a much weaker Spirit, as being impregnated with watry parts.

When you boil the solution of *Silver*, you must take care to keep but a gentle fire, for the matter easily rarifies, and rises over into the fire; or else it spirts some drops upon the hand of the Artist, which make it smart grievously, and fetches off the skin, because this liquor is not only very corrosive in it self, but has the assistance of fire to make it the more burning. You must likewise often cast your eye into the Crucible, especially towards the end, that so soon as the matter is observed to cease boiling, and gets the form of an Oyl, you be ready to cast it into the mould, for if you should then leave it longer in the fire, the strongest Spirits would evaporate, and the stone would not be so corrosive.

If you would melt the *Crystals* of the *Moon* in a Crucible, and boil the Liquor till it come into the consistence of Oyl, and afterwards cast it into the Iron mould, you would have an *Infernal stone* like this I have described.

When *Plate silver* is used to the making the *Infernal stone*, an ounce of *Silver* gains but three drachms in augmentation, but using fine *Coppel-silver*, you'll get five drachms. This augmentation of weight does proceed from the sharp acids of *Spirit of Niter*, adhering to the body of *silver*, but the difference of the increase lies in this, that the *Coppel-silver* having narrower pores than the other,

other does retain the *acids* better, and the *stone* is thereby the stronger, as I have found by experience.

Tincture of the Moon.

The *Tincture* of the *Moon* is a dissolution of some of the more rarified parts of *Silver* made in *Spirit of Wine* whetted by Alkali salts.

Dissolve in a Matrafs upon Sand a little warm two ounces of *Silver* with six ounces of *Spirit of Niter*. Pour the dissolution into a Cucurbit, or other Glass-vessel, wherein you shall have put a quart of Salt-water well Filter'd, the *Silver* will presently precipitate in a very white powder. Let it lye a while that all the Powder may fall, and then pour off the water by Inclination. Wash your Powder several times with Fountain-water to take away the Acrimony of the Salts: dry it upon paper, and put it into a Matrafs. Pour upon it an Ounce of the Volatile Salt of Urine, and four and twenty Ounces of the Spirit of Wine Rectified with the *Salt of Tartar*, after the manner I shall shew hereafter. Stop this Matrafs with another: that is to say, let the mouth of the one enter into the neck of the other, and this is that which is called a *Double-Vessel*. Lute well the junctures with a wet bladder, and digest the Matter in horse-dung, or some such gentle heat, for a Fortnight, during which time the *Spirit of Wine* will have got a bright Sky-colour. Unlute your Matrafs, and Filtrate the Liquor through a Coffin of Brown paper, and so keep it in a Viol well stopd.

You may use this *Tincture* for the Epilepsie, Palsie, Apoplexy, and other diseases of the Head. It is also used in Malignant Feavers, and all other Diseases wherein it is requisite to drive out the humours by Perspiration. The Dose is from six to sixteen drops in a convenient Vehicle.

There will remain at the bottom of the Matraass a *Calx* of Silver that may again be revived by means of the following Salts.

Take Eight ounces of *Niter*, Two ounces of Crystal powdered according as I shall shew hereafter, so much *Tartar*, and half an ounce of coals; Powder them all, and put it by little and little into a Crucible heated red-hot, a great Detonation will happen, after which you'll find the matter melted, pour it into a warm Mortar, and let it cool, you'll have a Mass that you must powder, and mix an equal weight of it with so much *Calx* of *Silver*. Melt this mixture in a Crucible over a strong fire, and the *Calx* will revive into Silver: take your Crucible out of the fire, and break it when it is cold, then separate your Silver from the salts.

Remarks.

This Operation seems at first to favour the opinion of those who hold there can be a separation of the Principles of Silver: for, say they, what is it can give this blue colour, after that the Silver hath been a long time digested with the Volatile Salt of Urine, and the *spirit of Wine Alcobolized*, but an inward sulphur of the Silver that separates

separates from it by the means of this sulphureous Liquor, and mixes with it, much after the same manner as we find these sorts of *Menstruums* usually dissolve the sulphur of Vegetables, Animals, and Minerals, and let alone their terrestrious and saline parts? But when we consider this Tincture a little nearer, we shall find it to be nothing but a dissolution of some part of the Silver it self, that hath been volatilized by the salt of Urine, and afterwards united with the spirit of Wine; so that if you draw off, or revive this dissolved Silver, there will remain no longer a Tincture, and this is the way for you to do it.

Pour your *Tincture* of the *Moon* into a Glass Body, cover it with its head, and fit a Receiver to it, lute the junctures close, and distil in a Vaporous Bath, about half the moisture, and you'll have a Liquor as clear as spirit of Wine. Put your Cucurbit into a cool place, and leave it there two days without stirring it, you'll find little Crystals on the sides, pour off the Liquor gently, which hath now lost much of its Sky-colour. Gather your Crystals, and continue to distil and crystalize the rest of the Liquor, till you have recovered all that is in it. Mix all your Crystals, dry them, and weigh them; and if you have half an ounce of them, powder them, and mix them with six drachms of the matter I described for reviving the *Calx* of Silver remaining in the Matrafs: put this mixture into a Crucible, and covering it with a tile, light a strong fire about it, to put the matter into fusion; then taking it off the fire, and letting it cool, break the Crucible, you'll find the Silver at the bottom, which will be fit for the same

Operation again, when you please. Note that all the Liquor which was drawn by Distillation, is as clear as common water: wherefore I conclude that the Colour did consist in the dissolution of Silver it self, and not of its sulphurs, as some have thought.

You must cut the Silver into little pieces or plates, that it may dissolve the more easily.

The Salt-water must be made of an ounce and a half of Salt dissolved in a quart of water: this salt precipitates the Silver, because it engages the points of the dissolvent, and shaking them violently about makes them let go the hold they had with other bodies. I shall speak more at large concerning these kinds of Precipitations in the Remarks which I shall make upon White Precipitate, and shall then explicate the reason why Sea-salt, which is an *acid* does precipitate that which another *acid* had dissolved. I shall likewise answer the objections which have been raised on this subject.

Silver may be also precipitated by means of a Copper-plate, as I have said already.

It is very indifferent which way you please to Precipitate it, for it is done for no other end, but to reduce the *Silver* into a very fine powder, for an easier dissolution.

The Precipitate of *Silver* made with salt, or Copper, waxes brown in the drying, and though dried in the shade, which doubtless is by reason of some small proportion of Copper that it contains.

If you have dissolved an ounce of *Coppel-silver*, and precipitate it with Salt or Copper, you'l draw an ounce and three drachms of Precipitate well washt and dried; this augmentation does proceed from

from a remainder of the points which were broken in pieces, and yet do still remain in the pores of the metal; for these pores being very small, they do but hardly let go what they have received into them.

There is no need of distilling a part of the Liquor, that the Tincture may be the stronger, as some have presumed to write: for on the contrary, it causes a Crystallization, which diminishes both its colour and strength, for the reason I have given before.

The effect of this Tincture for Diseases must rather be attributed to the Salt of Urine, and spirit of Wine, than to the Silver; for they are not only able to fly into the Head, and open obstructions there, but assisted with the Natural heat do open the pores of all the body, and drive out ill humours by transpiration.

The portion of Silver which remains at the bottom of the Matrafs being impregnated with volatile parts would fly into the Air, if it were melted alone without the addition of something else; wherefore the abovementioned matter is added to it, that being of a very fixt nature may weigh it down, and hinder it from flying away.

Diana's Tree.

Take an ounce of Silver, and dissolve it in three ounces of spirit of Niter, pour your dissolution into a Matrafs, wherein you shall have put eighteen or twenty ounces of water, and two ounces of Quick-silver. Your Matrafs must be fill'd up
to

to the neck ; let it lye still upon a little round of straw in some convenient place for forty days together, during which time you'l find a Tree spread forth its branches, and little balls at the end, which represent their fruit.

This Operation is of no use at all in Physick, I have here described it only to please the Curious.

Remarks.

These branches do proceed from the spirit of *Niter*, which being incorporated with the *Silver* and *Mercury* do form divers Figures, according to the room and moisture it hath to expatiate it self in. For if you should put to it but ten or twelve ounces of water, nothing but a kind of Crystals in great confusion would be able to appear. On the contrary, if you should use too much water, nothing would then be seen besides a little precipitated powder. You must let the mixture lye still for forty days together, because the spirit of *Niter* being very much weakned by common water is able to work but very slowly. If the matter should happen to be removed, the figure would quickly fall into confusion, but would recover it self again, if you let it lye still long enough. This Preparation is best performed in a cool place, being properly a Crystallization.

This Operation may be fitly compared with the manner of Generation and Nourishment of Plants in the Earth ; for if the seed abounds with too much moisture, the spirits which serve to ferment and dilate its parts, will be rendred so weak, as
not

not to be able to act, and so nothing can be produced; if on the contrary there should prove too little moisture, the spirits not finding room enough to expatiate in, would either continue imprisoned or evaporate into Air, and so be ineffectual. But when there happens to be a fit proportion of water in the Earth, then the spirits gently moving about do insensibly expatiate themselves, and do rarifie and sublime along with them the substance of the seed, from whence Vegetation doth proceed. But to return unto our Operation.

If you should desire to separate the *Silver* from the *Mercury*, shake the whole together, and having poured it out into an earthen Vessel, make it boil for half a quarter of an hour, then let it cool a little, till it becomes little more than lukewarm; pour upon it a quart of water by little and little, in which you have dissolved two ounces of Sea-salt, and a white *Precipitate* will fall down; pour off the water by Inclination, and dry the Powder. Then put it in a Retort placed in a Sand-furnace, and having fitted to it a Receiver fill'd with water, give a small fire at first, then encrease it by degrees till the Retort grows red-hot, and your Quick-silver will distil drop by drop into the water; continue the fire till nothing more will distil; let the Vessels cool; pour the water out of the Receiver, and having washt the *Mercury*, dry it with linnen, or the crum of bread, and keep it for use.

You'll find your Silver in the Retort, which you may reduce into an Ingot, by melting it in a Crucible with a little Salt-peter in a great Circular fire.

CHAP. III.

Of Tinn.

T*inn* is a Metal that comes near unto *Silver* in colour, but differs very much, in the figure of its Pores, and in the solidity and weight. The name of the Planet *Jupiter* is given unto it, and it is thought to receive its particular Influence from it. It is a malleable substance, and very easie to put into Fusion. It will not all of it quite dissolve in *Aqua Fortis*, as some have affirmed, but some part will remain undissolved, which shews it is compounded of different parts, and that its Pores are of a different figure. A virtue hath been attributed to it against the Diseases of the *Liver* and *Matrix*, but this quality is only imaginary, experience in no wise evincing the truth of it.

Pulverization of Tinn.

Tinn being of a malleable nature, cannot be reduced into a Powder after the usual ways of powdring. Therefore I'll give you a method how to do it easily enough.

Melt in a Crucible what quantity of *Tinn* you think fit, and cast it into a round wooden box, that has been rubb'd within on all sides with a piece

piece of chalk, enough to whiten it, cover this box, and presently shake it about, until your *Tinn* is become cold, and so you'll find it converted into a gray powder.

Lead may be *Pulverized* after the same manner.

Remarks.

The wooden box must be round, because that figure is the most proper to shake a thing in; and the clefts of the box must be joyned together as close as may be; and but little of the *Tinn* must be put into the box at a time, that the parts may be the better able to separate and fall into a powder, by means of the motion or agitation. Indeed the thing may be done without rubbing the box with chalk, but by this means the melted *Tinn* is hindred from burning the box, as it otherwise would. Now though this Operation may seem to be of no great use, nevertheless it will be found to be of very good use, in order to prepare several Operations upon *Tinn*. For by this means it will easily mix with Salts, and other matters.

Calcination of Tinn.

To *Calcine Tinn* is to reduce it into the form of a *Calx*, by the means of fire.

Put *Tinn* into a large earthen Pan unglazed, place it in a Circular fire, the *Tinn* will melt. Stir it with a *Spatule*, until it is reduced into Powder; continue

continue a great fire to it 36 hours, and stir it from time to time, then take it off the fire and let it cool, and you'll have a *Calx of Tinn*.

Remarks.

I use an unglazed earthen vessel, because the *Lead* which makes the varnish might mix with the *Tinn*, and so hinder the purity of it; a Pan is the figure that's proper for this *Calcination*, for being able hereby to spread the matter about with a *Spatule*, its Sulphurs fly away the more easily; insomuch that *Tinn* may be as well *Calcined* in such a vessel in six and thirty hours, as in four days time in a Crucible; the stirring it does likewise serve to drive out the Sulphur.

Salt of Jupiter of Tinn.

This Operation is a *Tinn* penetrated by *acids*, and reduced into the form of Salt.

Take two pounds of *Calcined Tinn*, put it into a Matraass, and pouring upon it distilled *Vinegar* to the height of four fingers, set it a digesting in Sand, for two or three days, shaking the vessel from time to time; afterwards pour off the liquor by *inclination*, and adding more distilled *Vinegar* to the matter remaining, digest it as before, decant the liquor, and repeat the adding new distilled *Vinegar*, and digesting it, three or four times more: then Filtrate all these impregnations and evaporate them in a glass Body in Sand to the consumption

consumption of three quarters of the liquor, let the remainder cool, and then remove the Body, without shaking it, into a Celler, or such like cold place, to lye still three or four days, and you'll find Crystals formed on the sides of the Body; separate them from the liquor, and evaporate some more of it, put that which remains into a Celler as before, and you'll find new Crystals; continue these evaporations and crySTALLIZATIONS, until you have drawn all your Salt of *Tinn*, which you must dry in the Sun, and keep in a Viol. This Salt is desiccative, when mixed in *Pomatums*; it may also serve for Tettars.

Those who do not concern themselves to have this Salt in Crystals may evaporate all the moisture of this dissolution, over a small fire, and they will have a Salt remain to them as good as the first.

Remarks.

This Salt is only compounded of the acid part of the *Vinegar*, incorporated into the *Tinn* after the resemblance of Salt, but if you should destroy these acids, the *Tinn* would resume its former shape. I shall shew the way of this Revivification, when I shall treat of Salt of *Saturn*, both being performed after the same manner.

If the *Calx* of *Tinn* had not been well *Calcined*, and dispossessed of some quantity of *Sulphur*, the acidity of the *Vinegar* would never have been able to dissolve it, because it would have been presently shocked in the supple yielding parts of the

the Sulphur without a capacity of acting; for that an *acid* may be capable of dissolving a body, it is requisite that the pores be fitly disposed, so that it may preserve its motion some time in which it may make its jostles.

You may separate one part of the impregnation of the *Calx* of *Tinn*, and pour upon it the Oil of Tartar *per deliquium*, and you'll have a Magistery of *Tinn*, because the Oil of Tartar which is an Alkali destroys the *acid* which kept up the *Tinn* dissolved, and forces it to let go its hold; you must wash this Magistery, and dry it, it serves for the same uses as that which I shall describe hereafter, but there is but little Magistery got by this preparation.

If a man would persist to *Calcine* the *Calx* remaining in the Bolt-head, and put more *Vinegar* to it, it would at last all dissolve, but the Operation would be too tedious.

Sublimation of Tinn.

To Sublime *Tinn* is to raise and Volatilize it by means of a Volatile Salt.

Take one part of *Tinn*, and two parts of *Sal Armoniack* in Powder: mix them well together, and put your mixture into a strong earthen Cucurbite, that is able to endure the fire, and whose two thirds at least do remain empty; fit unto it a blind Head, lute the conjunctions exactly well, and place your Vessel on the grate in a small Furnace with an open fire, but only open so as that the fire can pass through the Registers, and for that

hat end you must stop up the top of the Furnace with Bricks and Lute, leaving some little holes on the sides that are called Registers. The Cucurbite must likewise enter the Furnace a third part of its height or thereabouts. Give a small fire at first, then encrease it by degrees, till the bottom of the Cucurbite is grown red-hot, and continue such a fire till nothing more will Sublime, which you'l know by the Heads growing cool, and then the Sublimation is at an end. Let the Vessels cool, and so unlute them, you'l find *Flowers* stuck to the Head, and to the top of the Body, that are nothing else but some parts of *Tinn* raised up by the *Sal Armoniack*, and at the bottom of the Body you'l find some *Tinn* Revived.

Magistery of Jupiter, or Tinn.

This Operation is only a *Tinn* dissolved by an acid, and precipitated by an Alkali salt.

Dissolve the *Flowers of Tinn*, in a sufficient quantity of water. Filtrate the Dissolution; and pour upon it drop by drop the Spirit of *Sal Armoniack*, or the Oil of Tartar made *per Deliquium*, there will Precipitate a very White Powder. You must Edulcorate it by washing it several times with warm water, and afterwards dry it. It serves for Paint; for being mixed with *Pomatum*, it makes a very curious White.

Remarks.

It is to be considered in both these Preparations, that the Dissolution of *Tinn* is performed only by an *acid* Salt, which the *Sal Armoniack* is impregnated with; and this is the reason why the Volatile Spirit of *Sal Armoniack* doth serve to Precipitate it; for being an *Alkali* as well as the Oil of Tartar, it breaks the force of the *acid*, which therefore lets go what it held dissolved. That being granted, there will be no longer difficulty in conceiving how the Volatile Spirit of *Sal Armoniack* doth often Precipitate what *Sal Armoniack* had dissolved.

Flowers of Jupiter, or Tinn.

This Operation is a *Tinn* Volatilized, and raised in form of Meal, by the means of a Volatile Salt.

Take an unglazed earthen Pot, with a hole in the middle of its height, and a stopple to it, place the Pot in a Furnace of a just proportion wherein the pot may enter only as high as the hole, and with Bricks and Lute, take care that the fire may not transpire; fit upon this pot three *Aludels*, or open pots of the same earth without any bottoms, and fit a Head to the uppermost with a Receiver to the Head, lute well all the junctures, and light a good fire in the Furnace to make red-hot that part of the pot which lies within it, then mix

a pound of *Tinn* and two pounds of purified *Salt-peter*, throw a spoonful of this mixture through the hole of the pot, and stop it; a detonation soon follows, which when it is over, throw in another spoonful, and so continue to do, until all the mixture be spent; let the vessels cool, and unlute them, and you'll find in the receiver a little Spirit of *Niter*, and in and round about the *Aludels* very white *Flowers of Tinn*, gather them together with a feather, then wash them divers times with fountain water, and when you have dried them on paper in the shade, keep them in a Viol; they serve for Paint, and they make a curious White when mixed in *Pomatus*, or in some liquor.

You'll find in the bottom of the Pot a *Calx of Tinn* mixed with the fixt part of *Salt-peter*, boil it in water, wash and dry it, and it may be used in desiccative unguents.

Remarks.

It is a plain sign that *Tinn* does contain a *Sulphur*, because being mixed with *Salt-peter*, and put into the pot that's heated red-hot, it will flame; for you must not imagine that the detonation can proceed from the *Salt-peter* alone, this salt being never able to flame without the mixture of some Sulphureous matter, as I shall prove in its own place. But because the *Sulphur* of *Tinn* is lockt up in other substances, it remains quiet for some time to unite with the *Salt-peter*, before it raises a detonation. Nevertheless if you be in haste to dispatch, the detonation may be expedited

by introducing a small cole lighted into the hole of the pot to fire the matter.

These *Flowers* do proceed from the part of *Tinn* which is easiest to rarifie, and which the Volatile salt of *Salt-peter*, and the *Sulphur* of *Tinn* had raised.

You must take care, when you would make Detonations, to proportion the *Salt-peter* with the *Sulphur*, for otherwise they will not endure so long as they should; either there being too much *Sulphur* it will not meet with enough Volatile parts of *Salt-peter* to raise it all up, or else the *Salt-peter* being in too great a quantity for the *Sulphur*, it causes but a Sublimation in part, because the great quantity of this salt which remains at bottom, without firing, does fix some part of the *Sulphur*. Wherefore there was but little reason to believe that three parts of *Salt-peter* to one of *Tinn*, would raise more *Flowers*, than when there are but two, according to my description. For then there being too much *Salt-peter* for the quantity of *Tinn*, the Detonation will prove imperfect, and almost all the *Salt-peter* will remain at bottom, and will only serve to check some part of the *Sulphurs* of *Tinn*, hindring them from Subliming into so many *Flowers* as would otherwise rise.

Three *Aludels* and one Head, are used in this Operation, that the Vapours which rise in the time of Detonation may have room enough; for otherwise they would burst the Vessels, notwithstanding the casting in of the matter but little at a time.

The

The *Flowers of Tinn* are washt in order to deprive them of a Volatile Salt derived from the *Salt-peter* which was mixed with it, and the salt dissolves in the water, leaving the *Flowers* in their purity. You must dry them in the shade, for both the Sun and fire do render them black, and this because they do re-unite the particles of *Tinn*, which owe all their whiteness to the fineness of Pulverization, which gives them another Superficies than they had to reflect the light with.

CHAP. IV.

Of Bismuth, called Tinn-Glass.

Bismuth is a Sulphureous *Marcaassite* that is found in the *Tinn* Mines; many do think it is an imperfect *Tinn* which partakes of good store of *Arsenick*; its pores are disposed in another manner than those of *Tinn*, which is evident enough because the *Menstruum* which dissolves *Bismuth* cannot intirely dissolve *Tinn*.

There is another sort of *Marcaassite*, called *Zinch*, that much resembles *Bismuth*, and on which the same preparations may be made that I am going to describe.

Marcaassite is nothing else but the excrement of a Metal, or an Earth impregnated with Metallick parts.

The Pewterers do mix *Bismuth* and *Zinck* in their *Tinn* to make it sound the better.

Flowers of Bismuth.

This Operation is nothing but a portion of *Tinn-glass* raised up in form of meal by Volatile salts.

Calcine *Bismuth* as you do *Lead*, then mixing it with an equal part of *Sal Armoniack*, proceed to its sublimation as you did in that of *Tinn*. Thus you have *Flowers*, which you may dissolve in Water, and Precipitate with the Spirit of *Sal Armoniack*, or Oil of Tartar.

This *Magistery* or *Precipitate* serves for the same use as that which follows.

Magistery of Bismuth.

Magistery of Bismuth is a *Tinn-glass* dissolved, and precipitated in a very white powder.

Dissolve in a Matrafs an ounce of *Bismuth*, grossly powdered with three ounces of Spirit of Niter. Pour the Dissolution into a clean White-ware Vessel, and pour upon it five or six pints of Fountain-water, in which you shall have dissolved before-hand an Ounce of Sea-salt, you'll see a White powder Precipitate to the bottom. Pour off the Water by Inclination, and wash this *Magistery* several times, then dry it in the shade. It is an excellent *Cosmetick*, called *Spanish White*, that serves to whiten the complexion. It is either mixed in *Pomatum*, or *Lillie-water*.

Remarks.

Remarks.

You must use a large *Bolt-head* to dissolve the *Bismuth* in, because the great *Ebullition* that happens, as soon as *Spirit of Niter* is cast upon it, requires room to move in. You must likewise have a care as much as you can, of receiving the *Vapours* at your Nose or Mouth, for they are very offensive to the breast.

This quick and violent *Ebullition* proceeds from the *acids* immediate penetration of the large pores of *Bismuth* so soon as thrown upon it, and the *acid* violently divides all that opposes its motion. It happens also that the *Bolt-head* grows so hot, that a man can't endure his hand upon it, because the points of the *Menstruum* do chafe against the solid body of *Bismuth* with such force, that you may observe from thence much the same heat, as when two solid bodies are rub'd against one another. Add to this, that the great store of igneous particles contained in *Spirit of Niter*, may much increase this heat.

If the *Dissolution* becomes turbid through some impurities in the *Bismuth*, you must pour into it about twice as much *Water* and filter it; for if you should go to filter it without water, it would *coagulate* like salt in the *Filter*, and not pass through. This *Coagulation* proceeds from the *acid spirits* of *Niter* that are included in the particles of *Bismuth*, which finding too little liquor to swim in and disperse, do gather together into *Crystals* when the *dissolution* is cold.

The impurity which commonly swims upon the solution of *Bismuth*, is a fat or bituminous matter which will not dissolve in the *Spirit of Niter*.

This *Magistry* may be made by pouring in great quantity of Fountain water without any salt, into the *dissolution*, but it is made the quicker, when you use salt, and the *Precipitation* is the better because salt does encounter and break some of the acids that water alone was not able to weaken sufficiently.

Now some difficulty appears in conceiving how plain water alone comes to *precipitate Bismuth, Lead, & Antimony*, which the acid had dissolved, and yet can do nothing at all to the *precipitating Gold, Silver, or Mercury*, without the assistance of some salt or other body; I do imagine that the former having large Pores, the acids cannot stick so close in them but that water is able to force them out; but *Gold, Silver, and Mercury*, having finer pores in comparison than the other, do retain the acids so very closely that the weak impulses of water alone can make no separation; some more active body is requisite to do it.

The *Augmentation* which happens to *Bismuth* when made into a *Magistry*, does proceed from some part of the *Spirit of Niter* that remains still in it, notwithstanding the *Precipitation* and *Lotion*.

Commonly one Drachm of this *Magistry* or *Precipitate* is mixed with Four ounces of Water, or in an ounce of *Pomatum*. It softens the skin very much, and is also good against the Itch, because it feeds upon those acids or Salts which cherish this Disease.

CHAP. V.

Of Lead.

Lead is a Metal fill'd with Sulphur, or a Bituminous earth, that renders it very supple and pliant. It is probable that it contains some Mercury. It hath Pores very like those of *Tinn*; it is called *Saturn* by reason of the influence it is thought to receive from the Planet of that name.

Those who work upon *Lead* are subject to Colicks, and to become *Paralytick*, whether it be that there rises out of it a *Mercury* which obstructs the Nerves, or else that the very substance of *Lead* does act upon them after the manner of *Mercury*.

Lead is extremely cold, and for that reason is proper to assuage the heats of *Venus*, being applied to the *Perinaum*; and it may be the heat of the skin causes it to lose some particles, which insinuating through the pores do some way fix the Spirits, and qualifie their motion, from whence the part waxes cold: it is also applied on many Tumours caused by too great an Ebullition of the Blood.

Lead serves to Purifie *Gold* and *Silver*, and may be said to act in the *Coppel*, much after the same manner as the white of an Egg does in *Clarifying* a *Syrop* that's boil'd in a *Bason*; for as the gross and terrestrious impurities of a *Syrop* do stick to the

the white of an Egg by reason of its glutinous nature, and are driven to the sides of the Bason in the stirring, so do the *Heterogeneous* parts that were mixt with *Gold* and *Silver*, stick unto the *Lead*, and by the fire are driven to the sides of the *Coppel* like unto a *Scum*.

Calcination of Lead.

Melt *Lead* in an earthen Pan unglazed, and stir it over the Fire with a *Spatule* till it is reduced to a powder. If you increase the Fire, and still *Calcine* the Matter for an hour or two, it will be more open and fit to be penetrated by *acids*.

If you put this Powder to Calcine in a Reverberatory Fire for three or four hours, it will be of a red colour, and is that which is called *Minium*.

Lead is also prepared into *Cerusse* or *White-Lead* by the means of Vinegar, whose vapour it is made to imbibe; for it turns into a White Rust, that is gather'd up, and little Cakes made of it.

Two parts of *Lead* may be melted in a Pot or Crucible, and one part of Sulphur added to it; when the Sulphur is burnt out, you'll find the matter turned into a black powder, which is called *Plumbum ustum*.

All these Preparations of *Lead* are of a drying nature; they may be mixed with unguents and plaisters, they unite with oils or fat substances in the boiling, and they do give them a solid consistence, and the greatest part of our plaisters do derive their hardness from it.

I spoke of the way of reducing *Lead* into *Litharge*, when I treated of the Purification of *Silver* by the *Coppel*, and it is thither I desire my Reader to return.

Remarks.

There happens an observation in the *Calcination* of *Lead*, as well as several other things, which very well deserves some reflection. 'Tis that although the *Sulphureous* or *Volatile* parts of *Lead* do fly away in the *Calcination*, which loss should indeed make it weigh the less, nevertheless after a long *Calcining* 'tis found, that instead of losing it increases in weight.

Some trying to explicate this *Phænomenon* do say, that as long as the violence of the flame does open and divide the parts of the *Calx* of *Lead*, the acid of the *Wood* or other matter that burns, does insinuate into the pores of this *Calx*, where 'tis stopt or fixt by the *Alkali*; but this reason will not hold, when 'tis considered that this Augmentation comes to pass as well when *Lead* is *Calcined* with *Coals* as *Wood*, for *Coals* contain only a fixt *Salt* that rises not at all.

'Tis better therefore to refer this effect to the disposition of the pores of *Lead* in such a manner, that part of the fire insinuating into them does there remain imbodyed, and can't get forth again, whence the weight comes to be encreased.

If you would revive this *Calx* of *Lead* by way of *Fusion*, its parts do squeez and express the igneous particles that were inclosed, and the *Lead* does

does thereby weigh less than it did when reduced into a *Calx*, for by this means the *Sulphureous* parts are separated and lost.

Salt of Saturn.

This Operation is a *Lead* penetrated, and reduced into the form of Salt by the acidity of *Vinegar*.

Take three or four pounds of one of these Preparations or *Calcinations* of *Lead*, for example the *Cerusse*: powder it, and put it in a large Glass or Earthen vessel; pour upon it distill'd Vinegar four fingers high, an Ebullition will follow without any sensible heat. Put it in Digestion in hot Sand for two or three days, stirring about the Matter ever now and then; then let it settle, and separate the Liquor by Inclination. Pour new distill'd Vinegar upon the *Cerusse* that remains in the Vessel, and proceed as before, continuing to pour on distill'd Vinegar, and to separate it by Inclination, until you have dissolved about half the Matter. Mix all your Impregnations together, in an earthen or glass Vessel. Evaporate in a Sand-fire with a gentle heat, about two thirds of the moisture, or 'till there rises a little skin over it. Then transfer your Vessel into a Celler or some such cool place, without jogging it; there will appear white Crystals, which you must separate, and Evaporate the Liquor as before, and set it again in the Cellar. Continue your Evaporations and Crystallizations, 'till you have gotten all your Salt. Dry it in the Sun, and keep it in a Glass.

If

If you would make it exceeding white, you must dissolve it in equal quantities of distill'd Vinegar, and common water, then Filter it, and Crystallize it, as I said before. This Purification may be repeated three or four times.

It is commonly used in *Pomatus*, for Tettars and Inflammations; the Impregnation of Saturn is also used chiefly for Diseases of the skin; when it is mixed with a great deal of Water, it makes a Milk that is called *Virgins Milk*.

The Salt of Saturn taken inwardly is esteemed very good for the Quinsie, to stop the flowing of the *Menses* and Hemorrhoids, and for the Bloudy Flux. The Dose is from two grains to four in Knot-grass, or Plantain water, or mixt in Gargles.

Remarks.

I do commonly use *Cerusse* for preparing the Salt of Saturn, because I find it to be more open, and easier to dissolve, than the other Preparations of Lead, by reason of the Vinegar it is already impregnated with.

The Ebullition, that is observed, doth proceed from the violent entrance of the *acids*, which do forcibly separate the parts of the Matter. But it is remarkable that the Effervescency which happens upon pouring a like quantity of *acids* on any other preparation of Lead, is a great deal stronger; because when the *acid* meets with a body not so open as *Cerusse*, it must use greater endeavour to enter into it, and consequently raises up the Matter higher.

In

In these Effervescences as well as many others, you cannot perceive the least Degree of Heat, nay some presume to assert that Cold is increased in them. Vinegar loses all its force in the penetration of *Lead*, and acquires a kind of sweet or sugar'd taste.

You must not imagine that a true *Salt of Lead* can be drawn. It is nothing but a dissolution of its substance by *acids*, which do very closely unite with it, to form a kind of Salt. For if by distillation you should draw off the humidity of the Dissolution, you'd find it to be nothing but an Insipid water, and consequently deprived of all its *acids*. I shall prove that better hereafter, when we come to revive our Salt into *Lead*.

This Salt called *Sugar* by reason of its sweetness is good for many Diseases that are caused by *acid* or sharp humors, because it asswages them, and mitigates their keenness. This is particularly observed in *Quinzies*, whose cause doth ordinarily proceed from a saline or acid serosity, which falling too abundantly on the *Muscles* of the *Larynx* raises a fermentation that dilates their *fibers*, and causes the Inflammation we see. Thus whatsoever is able to dull the edge of Acids is good for the cure of this Disease.

Menstrual Purgations, Flux of the Hemorrhoids and Dysenteries are usually caused by sharp corrosive Salts which fall into the Vessels. Wherefore the *Salt of Saturn*, as all other matters that absorb Acids, do serve to cure these distempers; for take away the cause of a disease, and the effect will soon cease.

The sweetness of *Salt of Saturn* cannot be better explicated than by the Sulphureous or softish substance of the particles of *Lead*, which being actuated by the *Salt of Vinegar*, do delightfully tickle the Nerve of the tongue, when it is tasted.

Vinegar impregnated with some preparation of *Lead*, is called *Vinegar of Saturn*. If it be well tempered with Oil of *Roses*, or some other Oil, beating them together in a mortar, it makes an unguent that is called *Nutritum*, or otherwise *Butter of Saturn*; it is good for Tettars, and other disfigurations of the skin.

Magistery of Saturn.

This Operation is a *Lead* dissolved and precipitated.

Dissolve two or three ounces of the *Salt of Saturn* well purified, as I said before, in a sufficient quantity of *Water*, and distill'd *Vinegar*, filter the dissolution, and pour upon it drop by drop the Oil of *Tartar* made *per Deliquium*, it will first turn into a Milk, then a kind of *Coagulum* that will precipitate to the bottom of the Vessel in a white Powder. Boil it a little, and pour it into a Tunnel lined with a Coffin of brown Paper, the Liquor will pass through as clear as *Water*, and the Powder remain in it: Wash it several times with *Water* to carry off all the impression of *Vinegar*. Then dry it, and you'll have a very white *Magistery*, that is used for a *Fucus* like the *Bismuth*. It is likewise mixed in *Pomatus* for Tettars, &c.

Remarks;

Remarks.

When good store of Water is poured upon the Impregnation of *Saturn*, it turns white like Milk, and is commonly called, *Virgins milk*; it is used in Inflammations, and to Pimples in the face: if you let this Milk settle, it becomes as clear as Water, and a White powder sinks down to the bottom; this Powder does proceed from the particles of *Lead* which were held up by the acidity of the Vinegar, and were made let go their hold, by the access of Water diluting the acid. This Magistery being well washt may serve like the other that I now described; but because Water alone has not strength enough to destroy the acid so, as to make it quit every particle that it held dissolved, some part of the *Lead* still remains indiscernable in the liquor, and does not precipitate. Wherefore it is better to follow my description, in the making *Magistery of Saturn*. You must use an equal quantity of Water and Vinegar to dissolve the *Salt of Saturn*, for if you should use Water alone, it would rather cause a precipitation than dissolution.

The Oil of Tartar, or rather the Salt of Tartar dissolved being an Alkali destroys the edges of the Vinegar that suspended the *Lead*, whence it comes to precipitate; for finding nothing in the Liquor that is able to hold it up, it falls down by its own weight.

Now in this Operation there happens no effervescency at all, because the edges of the Vinegar being

being broken, the fragments of them which remain have not activity, and are not keen enough to enter into the pores of *Salt of Tartar* with a sufficient penetration. And it is the same thing with all other precipitations of matters which have been dissolved by Vinegar: but when the solution has been performed with stronger acids, the precipitations are made with ebullition, for the reason that I gave in my Remarks upon *Aurum Fulminans*.

This Powder being washt and dried is nothing but a *Cerusse* rendred exceeding fine. It is used for Paint, but this *Cosmetick* as well as all others that are made of Metallick substances, such as *Tinn* and *Bismuth*, do often black the skin after having whitened it, because the heat of the flesh doth gather together these Metallick Particles, which owed all their whiteness to an exact Alcoholification, and losing that, do often Revive.

Balsam or Oil of Saturn.

The *Balsam of Saturn* is a solution of *Salt of Saturn* made in *Oil of Turpentine*.

Put eight ounces of *Salt of Saturn* powdered into a Matrafs, and pour upon it Spirit of *Turpentine*, four fingers above it, place the Matrafs in a small Sand heat digesting for a day, you'll have a red Tincture; decant the Liquor and pour more Spirit of *Turpentine* on the Matter that remains in the bottom of the Matrafs, leave it in digestion as before, then separate again the Liquor which remains still a little coloured, and there will remain

at the bottom nothing but a little Matter, that you may Revive into Lead in a Crucible. Pour your dissolutions into a Glass-Retort, place it in Sand, and fitting to it a Receiver, distil over a gentle fire about two thirds of the Liquor, which will be Spirit of *Turpentine*: quench the fire, and when the Retort is cold pour that which is in it into a Viol, and keep it for use. This is the *Balsam of Saturn*, excellent for cleansing and cicatrizing of Ulcers. You may touch Chancres with it, though they be never so bad, for it mightily resists putrefaction.

Remarks.

The Spirit of *Turpentine*, to speak properly, is an exalted Oil. It dissolves Lead, and easily unites with it, because it is very sulphureous.

If you should still persist in putting new Spirit of *Turpentine* on the remaining matter, all the *Salt of Saturn* would at last dissolve.

Some do use to distil away all the Liquor, and keep that for Oil which comes forth last. But it is a great deal better to follow my description; for when all the Liquor is distilled, there will hardly have risen any Particle of *Saturn*, and therefore it cannot be so good.

Burning Spirit of Saturn.

Spirit of Saturn is an inflammable liquor which is drawn from *Salt of Saturn*.

Fill

Fill two thirds of an earthen Retort, or a glass one luted, with *Salt of Saturn*; place it in a Furnace over a very gentle fire, both for gently heating the Retort, and driving out a Phlegmatick Water; continue this degree of Fire, until the drops begin to have some taste, then fit to the Retort a large Recipient, lute well the junctures, and encrease the fire by degrees, a Spirit will come forth that will fill the Recipient with Clouds. When nothing more will come, let the Vessels cool, and having unluted them, pour what you find in the Recipient into a Glass-Cucurbite, and rectifie in a very gentle Sand-fire about half the Liquor, which will be the *inflammable Spirit of Saturn*, burning like Spirit of Wine, and of a sour taste.

This Spirit is very good to resist putrefaction of humours: It is also given in the Hypochondriack Melancholy from eight unto sixteen drops in Broth, or some Liquor peculiar to the Disease, and the use of it is continued every Morning for a Fortnight.

The other moyety of the liquor that remains in the Alembick, is called improperly *Oil of Saturn*; it is good to cleanse the eyes of horses.

If you take out the blackish matter that remains in the Retort, and put it in a Crucible upon burning Coals, it will reassume the form of Lead.

Remarks.

You must remember not to fill above two thirds of the Retort with the Salt, and to joyn a Re-

ceiver large enough, because these Volatile Spirits flying out with violence might be apt to break the Vessels, if they had not room to play in.

If you use six ounces of *Salt of Saturn* in your *Distillation*, you'l draw an Ounce and six drachms of liquor, and there will remain in the Retort six ounces and six drachms of a blackish and yellow matter; and if you put this matter into a *Crucible*, setting it in the fire, 'twill melt, and you'l regain four ounces of *Lead*, and half an ounce, or it may be six drachms of a yellow earth coloured like *Litharge of Gold*.

It is evident from this Operation that an ounce and six drachms of the more Acid parts of *Vinegar* are sufficient to impregnate four ounces and two drachms of *Lead*, to reduce it into *Salt*; but the strangest thing that happens to it, is the great change that *acids* do give it, insomuch that it is not to be known again in the least.

The *Augmentation* that the *Lead* in the Retort does here receive, is as evident as may be; for six drachms are taken out of it at last, more than were put in of *Salt of Saturn*, besides an ounce and six drachms of liquor that were drawn out. So that we must necessarily conclude, that the four ounces and two drachms of *Lead* are increased two ounces and an half.

It is probable enough that the more rarified the *Lead* becomes, the more capable it will be of igneous particles; for although the *Salt of Saturn* is not suffer'd to remain long in the fire, yet the *Lead* encreases apace. Possibly it may be, that as fast as the *acids* go out of it, igneous bodies enter in

in their place, and open likewise the *Pores* of *Lead* by their nimble motion; but these *Pores* must needs be so disposed as to shut again like valvules, and hinder the return back of those fiery parts.

When this *Calx* is *Calcined* in an open fire in a *Crucible*, without stirring it, the parts of *Lead* close together and expel the fiery particles, so that the *Lead* revives as it was before, and recovers its *Natural* gravity.

The matter when shut up in the Retort would never be able to revive, let the fire be made never so strong, because the igneous particles would have no liberty to get out.

The *Yellow earth* that's found in the *Crucible* seems to be of a Golden colour, it is a terrestrious and bituminous impurity that the *Lead* is purified from. There should be indeed but two drachms of it, because four ounces of *Lead* are recovered, wherefore the *Augmentation* must needs be from the fiery parts that remained in it as in a *Calx*.

Spirit of Saturn becomes inflammable from its containing in it some spirit of Wine, that remains still involved in the Vinegar, and was carried away with the *acids* into the *Pores* of *Lead*, when the *Salt of Saturn* was made; for if you quicken the Fire to distil this Salt, the *acids* break in pieces, and leave the Spirit of Wine at liberty, insomuch that the Spirit of *Saturn* hath no *acid* taste.

The matter that remains in the Retort after the Operation may be easily revived into *Lead*, as being deprived of the *acids* which gave it the form of Salt.

The Salt of *Saturn* may be likewise revived into *Lead* by mixing it with an Alkali Salt melted in a Crucible with a good fire, because this last Salt destroys the *acids* that kept the *Lead* thus disguised; but you must observe that it will flame before it revives, by reason of the Spirit of Wine that I said was included in the dissolution of *Cerule* made by Vinegar.

CHAP. VI.

Of Copper.

Copper is a Metal that abounds in Vitriol and Sulphur; it is called *Venus*, because this Planet was thought to govern it particularly, and bestow its Influences upon it: and for this reason there hath been attributed unto it the virtue of encreasing seed, and curing the diseases of those parts that serve for Generation.

But because *Copper* contains in it a *Corrosive* quality, I would advise no body to use it inwardly.

Copper takes Rust very easily, for if you leave but a drop of Water some hours upon a piece of it, it makes a *Verdegrees*. Have a care of drinking water, that has lain in *Copper* vessels, for it always dissolves some portion of it, which appears easily from the taste it leaves in it.

It

It will not be altogether amiss to make mention here of an effect that is no less strange than usual. 'Tis that *Water* or any other liquor that's heated or boil'd in a *Copper* vessel for a whole day together, savours not at all, or not so much of the *Copper*, provided that it be not removed off the fire all that time, as other water warm'd in a like vessel, and put from the fire but an hour; for whereas water alone can dissolve something of the *Copper*, it would seem that being aided with the heat of fire, it should partake of its nature the more. Now in my opinion this is the most rational explanation that can be given of this matter.

Every body may perceive that when the *water* begins to heat in a *Copper* vessel, that's set over the fire, little *Atoms* do rise at bottom like the stirring of a powder, and these *Atoms* do encrease according as the water receives more heat, so that at length they make it boil on high; these little *Atoms* can have no other cause than the fiery particles, which passing through the vessel, do drive the water upwards apace, and rarifie its parts; for this reason it is that the water is not able to dissolve any of the *Copper*, for being continually raised upwards, it can make no impression upon the bottom of the vessel.

Perhaps some will tell me, that the liquor might take the impression of the *Copper*, at the sides of the *Bason*; but it is easie to imagine that though there don't pass through the sides so many fiery particles as do at the bottom, there do pass nevertheless enough to hinder the liquor from sticking to or dissolving any particles of the vessel.

But now on the contrary the vessel being remov'd from off the fire, and the motion of the igneous particles being quite ceased, the liquor partakes easily of the *Copper*, and so much the more easily as the fire has rarified the metal, and rendred it more proper for dissolution.

Every thing seems to confirm this Opinion, for if any liquor is put to boil over a strong fire in a *Copper* vessel, it will not impregnate in the least, but if you place it upon a small fire, and leave it so for some time, then because there will not pass enough fiery particles, to cover all the surface of the vessel, and raise up the liquor, it will take some taste of the *Copper*; but this taste will not be so strong as if you had left it the same length of time in such a vessel off the fire, after it had been warm'd.

Liquors that are full of *Salts* do take the impression of *Copper* much more easily than those that are not. Thus *Confectioners* do observe what I have mentioned; for though they boil their *Confections* in vessels of *Copper* for a considerable time, they find them taste nothing of the *Copper*, but they know that if they should leave them but half an hour in the vessel taken off the fire, they would be tainted with a most loathsome *Copper* taste.

We may learn from this Discourse, not to use a *Copper* vessel, when we have a mind to boil or heat a liquor gently, and when we do think fit to use it, to be sure to keep a good brisk fire underneath, and not to let what we have boil'd, cool afterwards in a vessel of this nature.

Another

Another difficulty does here offer it self on this subject, and it is to know why a *Kettle* that has been taken off the fire, is not so hot at *bottom* as at the *sides*, so that as soon as it is removed from off the fire, one may touch it at bottom without burning ones finger, which can't be done at the sides without present scalding.

The reason of which is, that the fiery particles tending upwards through the bottom of the *kettle*, which is flat, in a direct line, don't make any stop in passing through, having but a little distance to conquer before they come into the liquor; but those that rise on the sides, finding a longer space to make upon the *kettle*, do many of them stop in the Pores of the *Copper*.

It is not the same thing in vessels that are made in another form, whose bottom is Globular, because the fiery particles rising up in an indirect line, do find more to do to pass through it, than in a flat bottom, and so by consequence more of them do stop.

But it is objected, that if igneous bodies do pass through the bottom of the *kettle* without any stop, they would not be able to heat it any more when it is empty than when it is filled with water; nevertheless it is plain, that when an empty vessel is set over the fire, the bottom does heat and grow red-hot, especially if left so a good while.

I answer to this, that when the *kettle* which was set in a great fire is full of liquor, the fiery parts having passed through the bottom in a strait line, as I said, are in a manner absorbed by the liquor, and have no more strength or action left to reflect again upon the bottom of the vessel,

and

and so to heat it; but now when it is empty, the fiery parts which pass through the bottom, finding nothing to drown them and check their motion, many of them do return back upon the bottom, and that way heat it so much as they do.

And the same reason holds, why an empty *Tinn* or *Leaden* vessel being set in the fire does quickly melt, but when filled with liquor they will not melt, make what fire under them you please; for the fiery parts finding nothing that is able to hinder their activity in an empty vessel, do pass to and fro through its pores often enough to melt it. But these same fiery parts finding moisture to engage them in a full vessel, they cannot return upon the bottom so as to melt it.

Copper does not melt so easily as many other matters, because it contains more terrestrious parts than those others.

Braß, or *Yellow Copper* is a mixture of *Lapis Calaminaris* and *Copper*, and vessels that are made of it give less impression to liquors than the others.

Calcination of Copper.

To *Calcine Copper*, is to purifie it from its more Volatile parts, by the means of common *Sulphur* and fire, in order to render it the more compact.

Stratise plates of *Copper* with powder'd *Sulphur* in a large Crucible, cover the Crucible with a Cover that hath a hole in the middle, to give the Vapours vent. Place your Crucible in a Wind-furnace, and light a very strong fire about it, until there rise no more vapours; then draw off
your

your Plates as they are hot, and separate them; this is the *Aesustum* that is used in outward remedies to deterge.

Remarks.

In the making of this stratification we begin with a bed of Sulphur, and lay over it a bed of Copper-plates, then another bed of Sulphur, and another of Plates. We continue to do so till the Crucible is quite full; but you must be sure to let the first and last bed be of Sulphur. This Calcination is thus performed, that the common Sulphur by its burning may cleanse the Copper of its superficial Sulphur; but it will be much better purified by the following Operation.

Purification of Copper.

This second *Purification* of Copper is to render it fair to the eye, and of a high colour.

Take what quantity you please of *Calcined Copper*, heat it red-hot in a Crucible placed among burning coals, and cast it red-hot into a Pot, wherein you shall have put enough Oil of Linseed to swim above it four fingers; cover the Pot presently, for otherwise the Oil would take fire, let the Copper steep, till the Oil is grown pretty cool, separate it, and put it to heat again in the Crucible, then cast it into Oil of Linseed; continue to make it red-hot, and quench it in the Oil nine several times. You must change your Oil every third time;

time; and you'l have a *Copper* well *purified*, and of its former colour. If you *Calcine* it once again, to consume the Oil, and powder it, you'l have a *Crocus of Copper*, that is deterfive and good to eat the proud flesh of Wounds and Ulcers.

Vitriol of Copper or Venus.

This Operation is a *Copper* opened, and transformed into a *Vitriol* by Spirit of Niter.

Dissolve two ounces of *Copper* cut into little pieces in five or six ounces of *Spirit of Niter*, pour the dissolution into a *Glass-Cucurbite*, and evaporate in Sand about the fourth part of the Liquor; put that which remains into a Cellar, or some other cool place, and let it lye there five or six Hours, you'l find *Blue Crystals*, separate them, and continue to evaporate and crystallize, till you have drawn them all; dry these Crystals, and keep them in a Viol well stopd.

They are Caustick, and are used to consume superfluous or proud flesh.

If you leave these Crystals in a Pan uncover'd, they will turn into liquor, that may serve for the same use.

Remarks.

You must put the *Copper* into a large body, placed within the Chimney, and pour to it by little and little the *Spirit of Niter*, there does presently rise a great effervescency, and a red cloud from it,

it, which would be very mischievous to the breast, if it were not avoided. Then the vessel grows so hot that a man cannot keep his hand upon it, and the heat continues until the solution be finished, for then the liquor clears up, and becomes of a fair *blue* colour.

The great effervescency that happens, does proceed from the sutable Pores of *Copper* to the edges of *Spirit of Niter*, so that they can make their entrance and jostles with a good force; for when these edges, which did before swim with all liberty in a liquid, do find their motion checkt in the body of the metal, they do strive to disengage themselves, and do thereby separate the parts of the *Copper*. It is this violent separation which causes the ebullition and heat; for the *acid* edges striking strongly against the solid parts of *Copper*, do cause a great agitation in the liquor, and by that means do excite a heat, much after the manner as when two solid bodies are beaten against one another violently, they grow so hot as even to strike fire.

The red cloud is derived from the *Spirit of Niter*, which upon rarefaction does always acquire that same colour.

When the *Copper* is but half dissolved, it is green, but when it is all dissolved, it assumes a *blue* colour; if you will separate the *acids* again from the *Copper* dissolved, and reunite the parts by the help of fire, it recovers its red colour.

After that the *acids* have divided the parts of *Copper* as much as they are able, they stick fast to them, and suspend them in the liquor. Some part of the liquor is evaporated, that the rest may

may crystallize the more easily. That which flies away in time of the solution, is the more phlegmatick part.

Vitriol of Copper is nothing but the acids of *Spirit of Niter* incorporated in the *Copper*; and it is these Spirits that cause all the Corrosion; for they are like so many little knives fastned to the Body of the *Copper*, which do tear and gnaw the flesh on which they are applied. This *Vitriol* dissolves into Liquor, because the *Copper* having large Pores, the moisture doth easily insinuate into them.

Other Crystals of Venus.

These *Crystals of Venus* are the acid part of the *Vinegar* incorporated into *Copper*.

Take what quantity you please of *Verdegrease* in powder, put it into a large Matrass, and pour upon it distilled *Vinegar* four fingers above it. Place the Matrass in Digestion in hot Sand; and let it lye so three days stirring it ever now and then, the *Vinegar* will acquire a blue colour; separate by Inclination the liquor that swims upon the *Copper*, and pour new distilled *Vinegar* upon the matter, leave it in Digestion for three days as before, decant the Liquor, and continue to put other distilled *Vinegar* on the matter, until three fourths of the *Verdegrease* or thereabouts be dissolved, and there remains nothing but a terrestrious matter. Then Filtrate all these Impregnations, and evaporate two thirds of the moisture in a Glass Body in Sand; put the Vessel into a Celler, and leave it there without stirring it

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four or five days: little *Crystals* will appear, separate by Inclination the Liquor, and gather them up; consume again about the third part of the moisture, and put it a crystallizing as before; continue these Evaporations and Crystallizations, till you have got all your *Crystals*, dry them, and keep them for the following Operation.

Remarks.

You had better use *Verdegrease* than crude *Copper* in this Operation, because it is more open, and disposed for solution by the *acids* of Vinegar; for *Verdegrease* is nothing but a *Copper* opened, and reduced to a rust by the fermenting spirits of *Tartar*.

For the making of *Verdegrease*, Plates of *Copper* are stratified with the husks of Grapes pressed. They are left so for some time, and part of these Plates is turned into *Verdegrease*, which is scraped off with a Knife; then these same Plates are stratified again with pressed Grapes, and are penetrated as before, and more *Verdegrease* made. This stratification is continued until the whole is turned into *Verdegrease*. You must observe that *Verdegrease* is better made in *Languedock* and *Provence* than other places, because in those Countries the Grapes do yield more *Tartar*, and consequently do abound in these fermenting Spirits, which do penetrate the *Copper*.

The *Crystals* of *Venus* are nothing but *Copper* dissolved, and afterwards coagulated with the *acids* of Vinegar, that incorporate with it, and form a kind of *Vitriol*.

Spirit

Spirit of Venus.

Put what quantity you please of the *Crystals of Venus* prepared with distill'd Vinegar, as I shewed before, into a Glass Retort, whose third part remains empty. Place your Retort in Sand, and Fitting to it a large Receiver, and Luting well the junctures, give a small Fire at first, to drive out a little insipid Phlegm; this Phlegm will be followed by a Volatile Spirit. Then augment the Fire by degrees, and the Receiver will fill with white Clouds. Towards the latter end kindle coals round about the Retort, that the last Spirits may come forth, for they are the strongest. When you see the clouds disappear, and the Recipient grow cool, put out the Fire: unlute the junctures, and pour all that which is in the Recipient into a Glass Body to distil it in Sand until it is dry. This is the rectified *Spirit of Venus*.

This Remedy is used against the Epilepsie, the Palsie, the Apoplexie, and other Diseases of the Head. Seven or Eight drops of it are given in a convenient Vehicle: many do use it to dissolve Pearl, Coral, and such like substances.

The black Mass that remains in the Retort may be revived into Copper, if put in a Crucible in a Fire of *Fusion*, with a little Salt-peter, or Tartar.

Remarks

Remarks.

The Acid is drawn from the *Copper* by *fire* without breaking its points ; for *Spirit of Venus* is considerably sharp, which happens not in other Metals. The reason that may be given of it is, that *Copper*, which is very full of Sulphur, doth but barely touch upon the Acids by its ramous parts. So that when these points are stirred by the violence of *fire*, they come forth whole, because they do not meet with resistance of a body hard enough to break them in pieces. They do also draw along with them, some of the most Volatile parts of *Copper*, with which they are inseparably united.

It hath been thought that this Spirit being poured upon Coral and Pearl, was able to dissolve them without losing any thing of its force ; so that when you would use the same Spirit, it would corrode the Matters as before. But Experience doth not confirm it ; it is true the dissolvent comes from the Coral with a great deal of sharpness, but it hath lost the Acidity which was the principal *Menstruum* ; and if there remains any sharpness, it proceeds from the *Copper*.

If you use a pound of Crystals of *Venus* in this distillation, you'll draw half a pound of liquor, and the matter which remains in the Retort will be just the same quantity.

CHAP. VII.

Of Iron.

IRon is called *Mars* from the *Planet* of that name, whose Influence it is thought to receive; it is a very Porous Metal compounded of a Vitriolick Salt, Sulphur, and Earth, ill digested together; wherefore the dissolution of its parts is very easily performed.

Iron is found in many *Mines* in *Europe*, in form of a *Stone* or *Marcaassite*, which much resembles the *Loadstone*, but this last is more heavy and brittle than *Iron*. The *Loadstone* is also found in *Mines* of *Iron*, and may be reduced into *Iron* by a strong fire. *Iron* for its part does easily acquire the virtue of the *Loadstone*, as every body knows, so that these bodies do seem to differ only in the figure of their Pores, as has been very well observed by our modern Philosophers.

Iron in the stone is melted in large Furnaces made on purpose, both to purifie it from some earth, and to bring it into the Form we desire. Having continued some time in *Fusion*, it *Vitrifies* as it were, and much resembles an *Enamel* of several colours; and it enters indeed into the composition of ordinary *Enamels*, with *Lead*, *Tinn*, *Antimony*, *Sand*, the *Saphire*, the *Stone* of *Perigord*, (a Province in *France*) *Gravelled ashes*, and the *ashes* of a *Plant* called *Kali*.

It.

It is turned into *Steel* by means of Horns or Nails of Animals, with which it is stratified, and so Calcined. These matters containing a great deal of Volatile Salt which is an *Alkali*, do kill or destroy the Acids of the *Iron*, that kept its Pores open, and do render it more compact. Besides the Fire carries off many of the more Volatile and Soluble parts of *Iron*, whence it comes to pass, that *Steel* will remain longer without rusting than *Iron*.

Steel is to be preferred before *Iron* for the making of *Utensils*; but for *Remedies*, *Iron* is the better beyond comparison. I shall give you the reasons for what I say in the following Operations.

Although *Mars* does contain an *Acid* Vitriolick Salt, yet it ceases not the being an *Alkali*, for it ferments with *Acids*, and no body needs wonder at this effect, when they consider there is more Earth than Salt in this *Metal*, and this Earth containing this Salt within it, retains *Pores* sufficient to receive the Points of *Acids* when thrown upon it, and so does the office of an *Alkali*; for as I have said speaking of the *Principles*, it is sufficient for a body to be called an *Alkali*, if it has its *Pores* so disposed as that the *Acids* may be able through their motion violently to separate whatsoever stands in their way.

Mars is almost always *Astringent* by *Stool*, by reason of its Terrestrial parts, and *Aperitive* by *Urine*, not only by reason of its piercing Salt, but also because when the body is bound, the humidities do more easily filter by way of *Urine*.

Opening Saffron of Mars.

This Preparation is only a Rust of *Iron* contracted in the Dew.

Wash well several *Iron Plates*, and expose them to the Dew for a good while, they will rust, and you must gather up this rust. Set the same *Plates* again to receive the Dew, and gather the Rust as before. Continue to do so till you have gotten enough.

This Rust is really better than all the Preparations of *Iron* that are called *Crocus*. It is excellent for Obstructions of the Liver, Pancreas, Spleen, and Mesentery.

It is used very successfully for the Green-Sickness, stopping of the Terms, Dropsies, and other Diseases that proceed from Oppilations. The Dose is from two grains unto two Scruples in Lozenges or Pills. Many do give *Mars* with Purgatives, which is a good Practice.

Remarks.

The Chymists have called Calcin'd Steel *Crocus*, by reason of its red colour; and they have given this name to many other Preparations for the same reason.

Though *Steel* hath been always used in the Chymical Preparations that are used in Physick, and is preferred before *Iron* for the Cure of Diseases; it is certain nevertheless that *Iron* is fitter for that intent

intent than *Steel*, because it is more Soluble; for if the action of *Iron* proceeds from nothing but its *Salt*, (as there is no reason to doubt,) the *Salt* of *Iron* must be much more easily separated in the stomach than that of *Steel*, because as I have shewn before, the Pores of *Steel* are more close than those of *Iron*, and therefore this must have quicker effects; besides that *Steel* being harder to be dissolved doth sometimes pass away with the excrements, without bestowing any impressiion on the *Chyle*. The reason that hath induced People to believe that *Steel* is better for use than *Iron*, was its being thought to be deprived of many impurities by Calcination, but that which is called Impurity is the more open part of the *Iron*, and consequently the more wholesome.

This Preparation of the *Saffron of Mars* is out of the common road, and longer a doing than the others; but it is the best of all that ever were invented. The Dew is impregnated with a Dissolvent that opens very much the Pores of *Iron*, and incorporating with it renders it more active and soluble than it was before.

Iron doth open Obstructions by its *salt*, which being assisted with the solid parts of the Metal, penetrates further than other *Salts*. But you must always purge and moisten the Person you give it to with broths before you presume to give it, because if it should find the passages of the small Vessels filled and obstructed with gross matters, it stops and sometimes causes Inflammations that create pains like to those of the Colick.

Many do use the *filings* of *Steel* without any Preparation at all.

Iron doth frequently open Obstructions by absorbing, as an Alkali, the Acid that fomented them.

Seeing that some persons have indeavoured to contradict the *Remarks* I have made upon the Effects of *Mars*, and particularly concerning the preference I have given *Iron* to *Steel* for Physical uses, I have thought it not convenient to end this Chapter, before I have laid down and Answered their Objections.

First then they say, that because the different substances of *Mars* cannot be separated, as those of *Animals* and *Vegetables* can, it is in vain that an *Aperitive* virtue is attributed to its *Salt*.

Answer, I grant, all the substances of *Mars* can't be separated so easily as those of *Animals* and *Vegetables*; but because we find *Salts* to be *Aperitive*, and commonly Remedies that are so, are full of *Salts*, and that *water* in which *rust* of *Iron* has steeped for some time, is proper to open by way of *Urine*, it seems to me rational enough to attribute this effect of *Mars* principally to its *Salt*; for if the *water* has carried off any taste or penetrating quality from *Iron*, there's nothing at all in *Mars* that is able to contribute such a virtue to it, besides the *Salt* therein dissolved.

Secondly, they say, the *Earth* and *Salt* of *Mars* being united and in a manner become *inseparable*, cannot act but by consent of both, and receive together joyntly the good or bad impressions, that may happen to them.

I *Answer*, there's no reason to think the *Salt* of *Mars* absolutely *inseparable* from the *Earth*, for the *water* in which this Metal has steeped or boiled, after

after *Filtration* does contain a *Vitriolick* taste, and *Aperitive* quality. Now it is the effect of *Salt* to dissolve imperceptibly in *Water* and drive by *Urine*, as I have said; but if any body would take the pains to steep and boil gently the *rust* of *Iron* a good while in *water*, then *Filter* it, and *Evaporate* the liquor over a small fire to a *Pellicle*, he'll by *Crystallization* or by an entire *evaporation* of the humidity, gain a small quantity of *Salt*; and it is probable enough that there was much more in the *water*, as may be collected from the strong taste it had of *Mars*, but it being something of a *Volatile* nature, it fum'd away in the *Evaporation*. I do not say nevertheless, that the close connexion of *Earth* with the *Salt* of *Mars* is altogether unuseful for this effect; on the contrary, I do conceive that this *Earth* rendring the *Salt* more heavy than otherwise it would be, does help to drive it forwards, and causes the *Mars* sometimes to penetrate as much by its gravity as by its *Salt*; but we must attribute the principal virtue to the *Vehicle* which is *Salt*, since without that, the *Earth* would be a dead matter, and would have no more action than other *Earths* bereaved of their *Salts*.

Thirdly, They say that in all probability *Mars* does act only according to the preparations which the different juices it meets with in the stomach do make; for these acid juices not failing to encounter with, and to dissolve it, there results from this dissolution a liberty to the parts of the body on which these juices did act, and consequently their restoration a-new.

I am willing to believe that sometimes *Mars* may act in the body like an *Alkali*, by absorbing and

sweetning the *acid* humour which it meets with, as it does absorb and sweeten the *acid* liquors which are poured upon it; but it must not be concluded from hence, that its Aperitive faculty does always consist in this effect, because as I before hinted, the water in which *Mars* has been put to boil, is Aperitive, and yet there is no Alkali in it to sweeten the *acids* of the body, when it is drunk.

Fourthly, They object, that we must not think the *hardness* of the parts of *Steel* above *Iron*, whose *Pores* are more open, does render it less proper for all sorts of Preparations, seeing *Spirit of Vitriol*, and many other *acids* are found to dissolve with the same ease both *Iron* and *Steel*.

I Answer, that if *Corrosive spirits* do dissolve *Steel*, they can dissolve *Iron* more easily; and whereas a smaller quantity of them can operate upon *Iron* than *Steel*, a better effect does thence follow.

Fifthly, 'Tis objected that the solidity of *Steel* may be an advantageous circumstance to it, for the better fixing the dissolving *Juices* that are in the stomach, and that for *Metals* the pure are to be chosen before those that are not so.

I Answer, that instead of the solidity of *Steels* being helpful to the stomach, it is certainly of great prejudice to it, as well as to those other parts it is distributed into; for the juices that are found in the stomach being but weak dissolvents, are not able to penetrate nor rarifie this metal, if it be too hard; so that they leave it crude and indigest, heavy and troublesome to this part: Wherefore it passes away by Stool, without any good

good effect, as it often happens. But now if a little of this *Steel* does happen to pass along with the *Chyle*, it rather causes than takes away *Obstructions*, for by insinuating into small vessels, it stops in the narrow passages, and causes grievous pains.

For what is said concerning the *Purity* of Metals, it is of great use to Tradesmen, for they by Purifying metals from their more rarified and *Volatile* parts, do make them the less *Porous*, and so the less liable to suffer prejudice from Air or time. Thus *Steel* is much fitter for Utensils than *Iron*, because its *Pores* are closer laid together, and it takes not *rust* so soon as *Iron*; but in *Remedies* it is not the same thing, for those Metals that are more rarified, and are more easily dissolved in the Body, are such as we find best effects from, for the reason I have given. So that what *Workmen* call *Purity*, is often but an *impurity* in *Remedies*.

Sixthly, They say, that if one would hope to find a distinct *Salt* in *Mars*, it would be more likely to find it in that which is *Purified*, than in the *Faces* which are separated from it, and which are indeed but the *Impurities* of *Iron*, that *Steel* is made of.

I Answer, there would be some reason to think that *Salt* might be more easily found in *Steel* than *Iron*, if in the making of *Steel*, *Iron* were simply *Calcined*, without adding *Nails* and *Horns* of *Animals* in the *Calcination*; for then it might be said that the *Sulphur* of *Iron* being in part evaporated, its *salt* would be the more *Soluble*: but we must consider that the *Volatile salts* which come from these parts of *Animals*, being piercing *Alkali's*,

Kali's, do destroy the *acid salts* of *Iron*, and do thereby render the *Steel* more compact, and unfit to take *rust*, because the *salts* which by their motion did rarify the *metal*, are fixed, and as it were mortified, and have not the capacity of acting as they did. This is the reason why a plate of *Steel* that has infused in *Water* will not give so great Impression to it, as a plate of *Iron* Calcined, of the same weight, infusing the same time, will do.

Another thing remarkable in the *Calcination* of *Iron* to turn it into *Steel*, is, that it is thereby deprived of its more *Volatile salt*, which should have most effect with it, in hopes to free it from *Impurities*, and that which is called the *Scories*, is the better part of *Iron* that has been rarified by its *salt*. Thus for the same reason that some are pleased to call the *rust* of *Iron* its dross, the whole metal may deserve the same appellation, all of it being capable of *rusting*, if it be but laid in the open air.

Another Aperitive Saffron of Mars.

This Preparation is the *filings* of *Iron* turned into *rust* in the Rain.

Put the *filings* of *Iron* into an earthen Pot unglazed, and expose it to the Rain until it turns into a Paste. Then set it a drying in the shade, and it will rust; powder it, and expose it to the Rain again as before, and so let it rust; continue to rehumectate, and rust this matter for twelve several times. Then powdering it very fine keep it for use. You may wet it with the water of Honey instead of Rain.

This

This *Crocus* hath the same virtues as the other, and is given in the same Dose. I cannot but prefer that which I described before, because I conceive it to be more open than this.

Another Opening Saffron of Mars.

This Preparation is only the *filings of Iron* Calcined with Sulphur.

Take equal quantities of the *filings of Steel*, and *Sulphur* powdered. Mix them together, and make them into a Paste with water; put this Paste into an earthen Pan, and leave it a fermenting four or five hours, after which put the Pan over a good fire, and stir the matter with an *Iron Spatula*, it will flame, and when the Sulphur is burnt, it will appear black; but continuing a good strong fire, and stirring it about two hours, it will be of a very red colour, which declares to you the Operation is ended. Let it cool, and this *Crocus* may serve in the same Diseases as the former; the Dose is from fifteen Grains to a Drachm.

Remarks.

I have thought good to deliver this Preparation for the convenience of such who need a great quantity of *Saffron of Mars*, and who have not leisure enough to make it according to the other descriptions, for it is sooner Calcined, and is of a redder colour than any that are made with fire.

A Paste is made of the mixture, to the end that the *acidity* of the Sulphur being diluted by Water may insensibly penetrate the Iron, and open it the better; and it is very easie to observe this penetration, seeing that the matter does grow so hot of it self, that a man can hardly endure his hand upon it. It is the same thing whether you make a smaller quantity, or make five and twenty or thirty pounds of this Preparation at a time, it flames, and half calcines before it is put upon the Fire, which cannot be explicated but by the violent action and frication of the *acid* part of the Sulphur against the solid body of this metal.

This Operation may very well help us to explicate after what manner the Sulphurs do ferment in the earth when it happens to tremble, and fires do burst forth, as does too often happen in many Countries, and among others at Mount *Vesuvius*, and Mount *Aetna*; for these Sulphurs mixing in *Iron* Mines may penetrate the Metal, produce a heat, and at last take flame after the same manner as they do in the present Operation. And it will be in vain to object, that there is no Air in the earth to help to fire the Sulphurs; for there are clefts sufficient in the earth to give entrance unto Air. But if there were not enough, the fermentation which happens at the meeting of *Iron* and *Brimstone* may be able to raise the earth in some places and to burst it a-sunder.

The great heat of many Mineral waters may likewise easily be explicated by the means of these Subterranean Fires, and how they came to receive those Sulphurs which we see are wont to be separated on the sides of the Bath, when the water is not disturbed. It

It is because those waters do pass immediately over, or else through the midst of some of these burning earths, wherein they are heated as they pass, and do imbibe the Sulphur. But when they are arrived to the place of the Baths, and have there a-while settled, this Sulphur being a fatt body cannot so intimately mix with the water, but that it will separate to the sides of the Bath.

It may be also, that some Mineral waters do owe their heat to a natural *Quick-lime* they may meet withal in their passage through the bowels of the earth; but this *Quick-lime* is only a stone calcined by the Subterranean Fires, of which I have spoken. And now to return to our Operation.

You must observe to make this Calcination rather in an earthen Pan, than Pot or Crucible, and to stir it continually with a *Spatula*, that the *Sulphur* may exhale the more easily. I have sometimes tried to do it in a Crucible, but the matter still remained black, though I persisted in calcining and stirring it for above twelve hours together.

If you have used a Pound of *Mars*, you'l get at least a pound and four ounces of *Crocus*, which proves, the *acids* of Sulphur, or some igneous bodies to incorporate in the pores of the *Iron*, and augment its weight,

The red colour proceeds from Vitriol that *Mars* is full off, which being calcined grows red like *Colcothar*.

Many other Preparations of *Opening Saffron of Mars* have been invented, but these three are sufficient as being the best.

Binding

Binding Saffron of Mars.

This Preparation is the *filings of Iron* deprived of their more Saline part.

Take what quantity you please of the last *Aperitive Saffron of Mars*; wash it five or six times with strong Vinegar; leaving it to steep an hour at a time, then calcine it in a Pot, or upon a Tile in a great Fire five or six hours; after that let it cool and keep it for use.

It stops the *Diarrhœa*, the immoderate flowing of the Hemorrhoids and Terms; the Dose is from fifteen grains to a drachm in Lozenges, or else in Pills.

Remarks.

Because *Mars* is an impure *Vitriol*, the more it is Calcined, the more astringent it is. But seeing that which renders it Aperitive is its Salt, or more soluble part, I intend by washing it several times with Vinegar to deprive it of much of its Salt. Afterwards I Calcine the matter to carry off by Fire what Aperitive parts might remain.

Not that I expect by this means to separate entirely all that is Aperitive in *Mars* from that which is astringent; that is a thing in a manner impossible, by reason of the strict union of its Salt and earth in the Mine; but I do believe it very probable to say, that if there be any thing astringent in this metal, as it cannot be denied, it must needs be the more terrestrious part.

I may likewise say, that if the astringent *Mars* has sometimes the effect of opening, it is by the remaining Salt that it opens; but when this Salt has done acting, the terrestrious part never fails to bind.

Lastly, I further say, that I do not believe any Preparation of *Mars* to be absolutely astringent, and that all we can do is to render it less incisive, and less penetrating than before, by depriving it of some part of its Salts.

Several other Preparations for making the *Astringent Saffron of Mars* are taught, but this one may suffice.

Salt, or Vitriol of Mars.

This Preparation is an *Iron* opened, and reduced into the form of *Salt* by an *acid* liquor.

Take a clean Frying-pan, and pour into it an equal weight of *Spirit of Wine*, and *Oil of Vitriol*; set it for some time in the Sun, and then in the shade without stirring it; you'll find all the Liquor incorporated with the *Mars*, and turned into a Salt that you must dry, and then separate from the Pan, and keep in a Viol well stoppt.

It is an admirable Remedy for all Diseases that proceed from Obstructions: the Dose is from four to twelve grains, in Broth, or some appropriate Liquor.

Remarks.

Remarks.

The Spirit of Wine serves here to moderate the too great force of the Oil of Vitriol, which if alone would indeed in a little time penetrate all the parts of the Iron, and cause a very impure Salt; but the spirit of Wine hinders its so quick dissolution; so that nothing but the more soluble part incorporates with the Oil, to make a Salt or Vitriol.

A *Frying-pan* is more proper for this Operation than another vessel less flat, because the liquor spreads it self about, and incorporates the better; you must use a Pan that is new.

If you use two ounces of Spirit of Wine, and the same quantity of Oil of Vitriol, in a small *Frying-pan*, you'll obtain five ounces of *Mars*.

You may put your liquor a thumbs height in the Pan, and leave it there a day and a half, or two days without stirring it.

The Oil of *Vitriol* is improperly called Oil, being nothing but the more caustick Spirit, as I shall prove in its proper place.

Riverius in his *Practice* gives a way of preparing the Salt of *Mars* like unto this; excepting that he puts more Spirit of Wine than Oil of *Vitriol*, but it is better to put equal parts as I have done.

Its virtue is greater than that of the *Crocus*, because it is whetted by the Oil of *Vitriol*, and therefore is given in a less dose; you must observe that sometimes it causes a nauseousness as all *Vitriols* do.

If

If you put this Salt, or Vitriol of *Mars* to dissolve in a cold place, you'l have a liquor that is called improperly, Oil of *Mars*.

Another Vitriol of Mars.

This Vitriol of *Mars* is an Iron dissolved, and reduced into the form of Salt by Spirit of Vitriol.

Put eight ounces of clean filings of Iron into a large Matrafs, and pour upon it two pounds of common water heated a little; add unto it a pound of good Spirit of Vitriol, stir it, and set your Matrafs in hot Sand, leave it in Digestion four and twenty hours, during which time the purest part of the Iron will dissolve; separate the Liquor by Inclination, and sling away the earthy part that remains in a small quantity at the bottom. Filtrate this Liquor, and evaporate it in a Glafs-Cucurbit unto a Skin in a Sand-fire, then set your vessel in a cool place, and you'l find green Crystals, which you may take out after having gently poured off the Liquor. Then evaporate again this Liquor unto a Skin, and Crystallize it as before, repeat these evaporations and Crystallizations until you have got all your Crystals; then dry them, and keep them in a Glafs bottle well stopd.

This Vitriol of *Mars* hath the same virtues as the former, and must be given in the same Dose.

L

Remarks.

Remarks.

The Spirit of Vitriol is weakned by the Water, to the end that it may be incapable of dissolving but only the purer part of *Mars*. Moreover if it were used alone, it would incorporate with the very substance of *Mars*, but would not be able to dissolve any of it, because there would be wanting sufficient moisture to separate its parts.

During the dissolution the liquor heats and boils considerably, because the acidity of Spirit of Vitriol doth violently enter the body of this metal, and makes a separation of its parts.

To *Evaporate* unto a *Pellicle*, doth signifie to consume the Liquor until a kind of thin skin is perceived to swim upon it, which always happens when some part of the moisture being evaporated, there remains but little more than is necessary to hold the Salt in *Fusion*.

An Acid Spirit may be drawn from this *Vitriol of Mars* by distilling it in a Retort in a Reverberatory fire, like common Vitriol; this Spirit hath been thought to have the same virtues as ordinary Spirit of Vitriol, but it can't be near so good, because it hath much blunted or broken some part of its edges against the body of *Mars*, in the dissolution and distillation. That which remains in the Retort after distillation, is that part of *Mars* which the Spirit of Vitriol had dissolved. It may be used like an aperitive *Crocus Martis*.

Those who do attribute the aperitive effect of *Mars* only to its sweetning (as an Alkali) the acid

acid juices which do too plentifully abound in mens bodies, will find it hard to explicate how these two last preparations do come to be esteemed the best aperitives which are made upon *Mars*, for the acid does so far predominate in their composition, that the Alkali is able to do little or nothing.

Tincture of Mars with Tartar.

This Preparation is a dissolution of *Iron* performed by the acid of *Tartar*.

Take Twelve ounces of the *Rust of Iron*, and Two pounds of *White Tartar of Montpellier*, powder and mix them together; then boil them in a great Iron pot or Cauldron with Twelve or Fifteen pints of Rain-water for Twelve hours time, stir the matter with an Iron Slice from time to time, and take care to put more boiling water into the Cauldron, according as it consumes; afterwards leave it a while to settle, and you'll have a black Liquor, Filtrate and evaporate it in an Earthen Pan over a Sand-fire, to the consistence of a Syrup, or till there rises a *Pellicle* upon it.

It is a very great Aperitive, it opens the most inveterate Obstructions, and is given in Cachexies, Dropsies, Obstruction of the Terms, and other Diseases that proceed from Oppilations; the Dose is from a Drachm to half an ounce in Broth, or some appropriate Liquor.

Remarks.

Water alone would not be able enough to penetrate the Iron, for to make a *Tincture*, though you should boil it a Month together. But when it is impregnated with *Tartar*, it dissolves it very easily. Nevertheless you must not think that this *Tincture* is a perfect solution of *Mars*; for if there were an intire solution of it, there would appear no more *Tincture* than there does in the solution of it with *Spirit of Vitriol* and water; but because the soluble part of *Tartar* which is the agent in this Operation, is only an impure acid Salt, it can but grossly rarify the *Mars*, and after mixing with it keep it suspended in the water.

After the *Tincture* is drawn, there remains a whitish matter, that you must sling away as good for nothing, it is a mixture of the grosser parts of *Tartar* and *Mars*.

This *Tincture* is called *Syrup of Mars*, by reason of a certain sweetness that is perceived in its Taste. It is reduced into the consistence of a Syrup, to keep the better.

As for its virtues, it is a very great Aperitive, because the force of *Mars* is assisted by the *Tartar*, that serves to be its Vehicle.

Opening Extract of Mars.

This Preparation is a solution of the more open parts of *Iron*, by aperitive juices, and reduced into a solid consistence by fire.

Take

Take Eight ounces of the *Rust of Iron* prepared in the Morning Dew, put it in an Iron-pot, and pour upon it three pounds of the Water of Honey, and four pounds of Must, or the juice of White grapes perfectly ripe. Add to it four ounces of juice of Lemons; cover it with an Iron Cover, and set it in a Furnace over a little fire; leave the Matter in Digestion three days, then boil the Matter gently three or four hours, uncovering the Pot ever now and then, to stir up the bottom with an Iron slice, then cover it again, that the moisture may not evaporate too fast. When you perceive the Liquor to be black, you must take away the fire, and leave it a while to settle, pass warm through a cloth that which is clear, and evaporate the liquor in a Sand fire, in an Earthen pan, or Glass vessel to the consistence of an *Extract*. 'Tis a very good aperitive; it hath the same virtues as the *Tincture* for Obstructions of the Liver, Spleen, and Mesentery; it delivers the Lymphatick vessels admirably well of what may hinder the current of *Serum*. The Dose is from Ten grains to two Scruples, in Pills, or else dissolved in some proper Liquor. That which remains in the bottom of the Iron pot is the more Earthy part of *Mars*, that is good for nothing.

Remarks.

This *Extract* doth not receive its consistence only from the *Iron*, but from the Tartareous juices of the Grapes and Lemons, with which it is mixed; its virtue is augmented by the Essential Salts,

and the Spirit of Honey that leaves in it a very good impression.

The mixture is left in digestion, for the better Dissolution of the *Mars*; but seeing the *Menstruum* is not very sharp or corrosive, it dissolves only the more *Saline* and soluble parts. This Description is not common, but may be preferred before many others.

Every body grants that *Mars* is as excellent a Remedy as any in all Physick, for opening Obstructions, and restoring a good complexion; but you must not be contented with giving it once or twice, but for a fortnight together; some intervals may be observed, that nature may not be troubled too much. In hot climes, such as *Languedoc* and *Provence*, where are more Oppilations than in other Countries, they make no difficulty to take it sometimes every day for a month together, after a due Preparation, and it is the best Remedy that hath been known for that Distemper.

Binding Extract of Mars.

This Preparation is a solution of *Iron* made with an astringent Wine, and reduced into a thick consistence, by fire.

Take Eight ounces of the *Rust of Iron* powdered very fine, put it into an Iron pot, and pour upon it four pints of a strong Red wine; set the pot over the fire, and having covered it, make the Matter boil, stir it from time to time with an Iron

Iron slice, till two thirds of it be consumed; pass the Liquor warm through a cloth, and evaporate it to the consistence of an *Extract*. It stops the Looseness, Bloody Flux, the Flux of the Hemorrhoids and Terms; the Dose is from Ten Grains unto Two Scruples in Pills, or dissolved in some astringent Liquor.

Remarks.

The strongest Red-wine is of so high a colour, that it appears to be black; with this Vintners do colour their White wines, they do make them to be either pale or red, according to the quantity of it they mix. And the Dyers do likewise use it.

This Wine becomes impregnated only with some part of the *Mars*, because the *Tartar* which it contains is capable but of dissolving the more rarified part of this metal, the rest remaining in the bottom of the pot. The astringent virtue of the Wine does much increase that of the Iron, and renders it very proper for the distempers before-mentioned. But you must not think that its aperitive Salt is wholly destroyed, for it still opens Obstructions, and passes by way of Urine: indeed it does not act this way so powerfully as the aperitive Extract of *Mars*, but effects of that kind are observ'd from it.

The same Remedy may be both astringent by Stool, and aperitive by Urine, because that when the body is bound, the Serosities, which were wont to pass by Siege, do become diverted into the

Urinary passages. On the contrary, in a *Diarrhoea*, the moist humours which would otherwise have taken their course by way of Urine, do here turn it by siege.

Mars Diaphoretick.

Mars Diaphoretick is only the particles of *Iron* impregnated with Volatile Salts.

Powder and mix together equal quantities of the *rust of Iron*, and *Sal Armoniack*, put this mixture into an Earthen Cucurbite, set it in a small Furnace, and stop up the bottom with Lute and Bricks, that the fire may not be able to pass upwards, but only through certain holes or Registers; fit to your Cucurbite a blind head, and give a gentle fire at first; augment it by degrees to heat the Cucurbite red-hot, and continue this degree of heat, until there arise no more vapours; then let the vessels cool, and taking off the head gather the sublimed *Flowers*, dissolve them in water sufficient only to dissolve them, filtrate this dissolution through a Coffin of brown paper, and pour upon it drop by drop the Oil of Tartar made *per Deliquium*, or else the Spirit of *Sal Armoniack*, a powder will precipitate to the bottom of the vessel, decant the Liquor, and dry this *precipitate*; it causes Sweat, and is good against all diseases that proceed from a corruption of Humors; it sometimes also dries by way of Urine, according as bodies are disposed: it is excellent against the Hypochondriack Melancholy, and in Quartan Agues: the Dose is from ten to twenty grains in pills, or some proper Liquor.

Remarks.

Remarks.

This Preparation is Sudorifick by reason of some particles of *Sal Armoniack* that remain in the Precipitated *Mars*; for when these Saline parts are actuated by the heat of the Body, being of a very Volatile nature, they do insensibly distribute themselves rather into the Pores of all the Body, than follow the course of fixt Salts by way of Urine; whence a Sweat does come to follow, or sometimes an insensible transpiration, because it rarifies and gives vent to abundance of Humors that were not able to pass, by reason of their viscosity. Sometimes also finding the Pores too much obstructed, it is forced to become fixt, and follow the ordinary course by way of Urine, and then it opens the *Lymphatick vessels*, and evacuates several matters that were contained in them.

People often find greater benefit from much Urine than Sweat, because the way of Urine is more natural and weakens less.

CHAP. VIII.

Of Mercury.

Quick-Silver is a prodigy among Metals; for it is fluid like water, and though a very heavy body, yet it easily flies away when set over the fire.

It is probable, that the parts of this Metal are all of a round figure, for divide it how you will without adding to it, and it always keeps a globular form to every part; and if you look a little near it, when it dissolves in *Aqua fortis*, you'll observe an infinite number of little round bodies, which rise up in the liquor, like smoke.

Now the parts of *Mercury* being supposed round, it may be explicated how this metal does remain fluid, and why it Volatilizes so easily by fire, although it be so exceeding heavy, for the round figure being no ways proper for the connexion or union of parts, the little bodies which do compose the *Quicksilver*, cannot adhere together, and consequently they must roul one upon another, as we see happens to all round bodies; and this is that which causes the fluidity of this metal.

As for its Volatility, it proceeds from this, that the round parts being only *contiguous*, and having no proper union together, nothing hinders its parts from rising by the force of fire; for that which makes the other metals to be more *fixt* than

Mercury,

Mercury, and to remain in the fire without consuming wholly, is because their parts are *continued*, and so fastned together that fire has no power to disunite them in order to Volatilize them.

It may be objected that the parts of *Quicksilver* being granted round, they should for the same reason be light, because the round bodies which approach one another, do leave many empty spaces between them.

But though there are such vacuities, the little balls are massive and compact, and this causes their gravity.

There's another objection, that is, the parts of *Mercury* are heavy, how come they to be volatilized by fire?

I answer, that when these parts are said to be heavy, it is in comparison with other little bodies that are lighter: but you must not imagine that every part of *Mercury* should be heavy enough to resist the rapid nature of fire. But besides, these little *Mercurial* bodies, which we suppose to be compact, may have their Pores of such a texture, that the igneous parts being once gotten within them, may not be able to find a way out again, and so they and their small prisons may fly up together.

It is called *Quicksilver* from its fluidity, and *Mercury* because it changes into different shapes, like the *Celestial Mercury*, from whom it is thought to receive its Influence.

It is to be found in many places in *Europe*, as *Poland*, *Hungary*, and even in *France*; for a few years since there was discovered near *St. Lo* in *Normandy*, a Mine abounding in *Cinnabar*, from whence good store of *Mercury* is drawn.

Some

Some of it is also found *running* in the Mines, and this is passed through a Shammey skin to purifie it from some Earth that it may be joyned with; but because it doth sometimes prove very difficult to separate it from the Earths with which it is in a manner incorporated, they are forced to distil it through Iron Retorts into Receivers filled with water.

Natural Cinnabar, called *Mineral*, is a mixture of *Mercury* and *Sulphur* that sublime together by the means of a Subterraneous heat, and this is done near after the same manner as *Artificial Cinnabar* is made, of which I shall speak anon.

Quicksilver by reason of its fluidity is hard to transport, wherefore a great quantity of it is reduced into *Cinnabar*, (in the places whence it is taken) after the manner following.

Artificial Cinnabar.

Cinnabar is a mixture of *Sulphur* and *Quicksilver* sublimed together.

Take a quantity of *Sulphur*, and melt it in a great earthen pan, then mix by little and little thrice as much *Quick-silver*; you must stir about and preserve the Matter in Fusion, till all the *Mercury* disappears. Then powder your mixture, and sublime it in pots in an open fire well governed, you'll have a hard Mass, and of a very red colour. If any heterogeneous Metal should have been mixt with the *Mercury*, it would remain at the bottom of the Pots.

Besides

Besides the convenience of easily transporting *Mercury* by this means, it is very useful in Painting. It is also used in *Pomatus* for the Itch, and to make Fumes withal to raise a Salivation.

Remarks.

A pound of *Sulphur* is able to incorporate three pounds of *Mercury*, and to make a Mass together.

The cause of this mutation of *Mercury* into *Cinnabar* does proceed from the penetration which the more acid part of *Sulphur* does make into the *Mercury*, and the intangling its parts whose motion is now checkt. And being raised by the fire it volatilizes as it does, but the Saline or acid Spirits of *Sulphur* do fix it, so as that it is constrained to stop its volatility, and settle in the upper part of the pot, which is called *subliming*; whereas when it is all alone, or else joyned with some matter that cannot fix it, it evaporates quite away.

Cinnabar is shaped like needles, by reason of the acid Spirits of *Sulphur*, which have entred into its body, and have impressed such a figure; its red colour may proceed likewise from the *Sulphur*, which is of this colour when it is well rarified.

This Red appears brown while the *Cinnabar* is in the Mass, but if you powder it very fine, beating it a good while, it becomes of a shining, and that so high a colour, that it has been called *Ver-million*. Some women do rub their Cheeks with it, when they have mixt it in *Pomatum*, but they don't consider that so dangerous an accident may happen from it, as a *Salivation*. The

The Fumigation with it, is made by causing a patient to receive the Fume of the *Cinnabar* thrown into the fire.

Reviving of Cinnabar into Quick-silver.

This Operation is performed in order to separate the *Sulphur* which is in the *Cinnabar*.

Take a Pound of *Artificial Cinnabar*, powder it, and mix it exactly with three pounds of Quick-lime also powdered; put the mixture into an earthen or glass Retort, whose third part at least remains empty. Place it in a Reverberatory Furnace, and after having fitted to it a Receiver filled with Water, give your fire by degrees, and at last encrease it to the height, the *Mercury* will run drop by drop into the Receiver; continue the fire until no more will come; the Operation is commonly at an end in six or seven hours. Pour the Water out of the Receiver, and having washed the *Mercury* to cleanse it from some little portion of earth it might carry along with it, dry it with Linnen, or the crum of Bread, and keep it for use.

You must draw thirteen ounces and a half of flowing *Mercury* out of each pound of *Artificial Cinnabar*.

You may again *Revive* the *Cinnabar*, by mixing it with equal parts of filings of *Iron*, and by proceeding in the Operation, as I have taught.

Remarks.

Remarks.

When *Mercury* is thus revived, you may be sure of its purity, because if any Metal should have mixed with it in the Mine, it would remain, as I have said, at the bottom of the Pot you sublime it in: and if the *Cinnabar* were adulterated, that which had been used in the adulteration, either would not rise with the *Mercury*, or else would separate from it in the Receiver.

Cinnabar being nothing but a mixture of acid Spirits and *Mercury* together, if you mix it with some Alkali, and drive it upwards by fire, the Acids, for the reason I have already spoken of concerning the *Depart* of Silver, must leave the Bodies they were joyned to before, for to enter into the Alkali, and this is what happens here, for the Acids finding the Quick-lime very porous, do leave the *Mercury*, and adhere to the Quick-lime; so that this *Mercury* being disengaged from what held it fixt before, and forced by the fire, comes forth of the Retort in form of Spirit, but the coolness of the Water that is in the Recipient, condenses it, and resolves it into *Quick-silver*.

A third part of the Retort is left empty, because the rarified *Mercury* comes forth with such violence as would otherwise be apt to break the Retort.

You must leave the mixture to settle a day or two, before you put the fire under it, to the end that the Quick-lime may flake the while, for if you should not observe this circumstance, the Retort

tort would burst. You might also use such a Quick-lime as has been already slak't in the air, and then you might begin your distillation immediately after the mixture, but I do think that the *Revivification* will be the more exact, when unslak't Lime is used, because the Alkali will act more strongly upon the Sulphureous acids.

When the distillation begins, abundance of Sulphureous fume is seen to come out of the Retort; the juncture of the Receiver with the Retort must not be luted, because it is better to let this Sulphur fly away; for if it had no vent, we might have reason to fear lest some part of the *Quick-silver* would joyn and unite with it in the Receiver, and so we might be obliged to make a second *Revivification* of it.

If by way of curiosity you weigh the Lime which remains in the Retort after distillation, you'll find three pounds and half an ounce of it, this little augmentation of weight proceeds from a remainder of the Sulphur of *Cinnabar*, and the matter does smell of Sulphur.

Quick-silver is one of the greatest remedies we have in Physick, when it is used as it should be, but is full as dangerous, when it happens into the hands of *Quacks*, who use it upon all occasions for all sorts of Diseases, and give it indifferently to all sorts of persons without any respect to the Temperament they are of. Those who draw it out of Mines, or work much with it, do often fall into the Palsie, by reason of Sulphurs that continually steam from it; for these Sulphurs consisting of gross parts do enter through the Pores of the Body, and fixing themselves rather in the Nerves

by

by reason of their coldness, than in the other Vessels, do stop the passage of the Spirits, and hinder their course:

Mercury is given in the Disease called *Miserere*, unto two or three pounds, and is voided again by siege to the same weight; it is better to take a great deal of it than a little, because a small quantity might be apt to stop in the circulations of the Guts, and if some Acid humours should happen to joyn with it, a *Sublimate Corrosive* would be there made; but when a large quantity of it is taken, there's no need of fearing this Accident, because it passes quickly through by its own weight.

Mercury mixes so well with resinous and fat Bodies, as to remain imperceptible; all *Unguent*s, *Pomatus*, and *Plaisters* in which it enters, are good against the Itch, and Tetters, and do dissolve cold tumours, because it opens the Pores, and drives by perspiration. Furthermore, seeing these Distempers are fomented by Acid humours, it breaks their edge, and hinders them from causing any further Fermentation.

Hitherto there is no Remedy found out to be so sovereign for the cure of Venereal Maladies, as *Mercury*; wherefore its greatest enemies have been forced to fly to it, after they had tried a long time to no purpose to drive out the poison by other Remedies. And in truth if we knew any milder ones that were able to terminate the Accidents of the Pox as well as this does, 'twould argue much rashness to make use of *Mercury*, because it is not always conducted according to our desires, and sometimes very scurvey consequences

do happen upon it; but we know no other that can be esteemed to approach it in virtue for all Venereal Diseases, and especially the Universal Pox. It is killed in Turpentine, then with Suet an Ointment is made of it, that serves to rub the parts of the Body, and particularly the joints with, several days together, after the Patient hath been prepared by Baths, Broths, and Purges. The Friction is continued until the *Salivation* rises, which is caused by a great many Shancres in the mouth; for these Shancres by an exceeding great acrimony do open exceedingly the salivating Vessels, and give way to a tickling Phlegm, that runs down abundantly. A Flux is also raised by applying *Mercurial Plaisters* upon all the Body, and also by *Fumigations* by making one receive the Fume of *Mercury*. Again it is raised by taking inwardly *white Precipitate*, or some other Mercurial Preparation, without using it outwardly. Let us now come to reason a little upon it.

The effect of *Mercury* hath puzzled almost all Chymical Philosophers; and those Moderns who have explicated with much probability and likelihood many other Natural things that lay hid to our Forefathers, have declared those of *Mercury* to be some of the most difficult. I know very well that several Persons governed by false Principles, have not forbore to give us their Explications; but when their discourses come to be examined by Chymistry, which alone is able to give us Demonstrations on this matter, they presently come to nothing. I shall here present you with a Thought of mine, that seems more probable than any thing I ever met with, and is maintained by Chymical Experiments. You

You must first take notice, and it is a thing indisputable among all Physicians, that the Nodes, Tumors, and other effects of the Venereal Poison are fomented by Saline or Acid humours which make a certain Ferment, and that this disease can never be cured, until this Poison is quite destroyed. This being supposed, we must examine the nature of *Mercury*, and see what will become of it, if we mix it with Salts or Acids. I have said that *Mercury* is a Volatile, and we shall find hereafter that in the making of *Sublimate Corrosive*, *Mercury* is mixed with *Salt* and *Vitriol*, which are Acids; that upon the encreasing the fire, the Spirits adhering unto *Mercury*, which is an Alkali, do *sublime* along with it to the top of the Vessel, and make together that which is called *Sublimate Corrosive*; Let us now see in the cure of the Pox, how *Mercury* is used.

It is mixed, as I have said, with Suet, and with this Unguent the parts of the Body are rubbed a long time, that the *Mercury* may pierce and enter through the Pores; which it does, as every Body must grant; and this hapning, there's no contradiction at all in thinking that some part of it mixes with the Saline or Acid Ferment of the venereal matter, after the same manner, as it doth with *Salt* and *Vitriol*.

The Acid Salts of the Venereal Poison fixing in the Pores of *Mercury*, which is, as I have said, a Volatile Alkali, do sublime together, being driven by the heat of the body, up to the head, which is the top of the vessel, and the coolest place, and so most proper to condense them.

At the same time it is that the Head swells, and the inside of the mouth is full of Shancres, which cause a pain much like unto that a man would receive, if *Sublimate Corrosive* were applied some time upon an excoriated part. Moreover the *Salivating Vessels* being prickt and corroded with this sharp humour, do open, and let fall abundance of Phlegm, and this causes the involuntary Salivation, that uses to accompany these Shancres, and remains sometimes a longer, sometimes a less time, according as the Shancres are more or less acrimonious; for the Phlegm trickling down continually, cleanses them from their keen Salts, and mitigates the pain, whence it comes to pass that they are often cured of themselves, and then the *Salivating Vessels* closing up again, the Flux doth cease.

It sometimes happens, when a man is not well prepared to receive a Flux, or that it is raised too soon; that the Sublimation being too violent, some part of the *Sublimate* sticks to some one or more of the vessels, and coroding their membrane, causes grievous Hemorrhagies, as I have seen to happen several times, and among others to a man in *Languedock*, who voided in half an hours time twelve pints of blood by mouth, without dying of it notwithstanding, because he was a very stout lusty man.

As for what may still remain of the Venereal Poison, after the Salts are driven out, its dissolution is then a very easie business, because nothing but those Salts was able to hold it coagulated; so that it is easie to conceive, that the subtiler part of it may pass through the Pores, and the more

more terrestrious precipitate, and be evacuated by way of Urine.

Perhaps you'll object, that *Mercury* will raise a Flux in Persons who never had such a Disease as the Pox, and who never had any of those tumours that contain Acid Salts; but it is an easie matter to answer, that there is no man whatsoever, let him be never so sound, but hath store of Saline or Acid humours in his body; the *Serum* which runs into every part is full of Salt, and all the Ferments that preserve the Oeconomy of Nature, do it by nothing else but Salts or Acids; Now there is no more difficulty in comprehending that *Mercury* may joyn with the Acids of a sound Person, than those of an impure tumour: for I don't think that *Mercury* goes immediately and seeks out the Acids in the tumours of impure Persons, it must have an understanding to do that; but being rarified and moved by the heat of the body, it circulates every where, until it comes to find a Salt that is able to fix it in some measure, and hinder its motion.

Sometimes this *Mercury* not meeting with salts enough to detain it, passes off by transpiration, and carries along those that were united to it; whence it comes to pass that many have been cured of the Pox without a Flux.

At other times it meets with Alkali salts which force it to quit its hold of these Acids, and then it precipitates downwards, and purges by way of stool, whence it comes to pass that those who have a looseness in the time of their taking *Mercury*, are exceeding hard to receive a Flux.

Upon the same Principle may be given the reason of many other Accidents which follow the use of *Mercury*. But let us see whether any thing of use may be drawn from this Discourse for the cure of Venereal Maladies.

Although the *Poulains*, *Phymosis*, *Shancres*, *Gonorrhœa's*, and other *Precursors* of the Pox, may be cured without a Flux, yet nevertheless you must not neglect the use of *Mercury*; for these Diseases do contain in them a Poison that is not at all different from that of the Pox, but only in that it hath not fermented enough to be rarified and carried by the Circulation into the Habit of the body; so that there will remain some Salts which cannot be carried away clear by any thing but *Mercury*, which when given in a small quantity on these occasions, drives only by perspiration or by stool, without a Flux. Sweet *sublimate*, of which I shall shortly speak, is very much used in these Distempers, among other general Remedies.

When you undertake the cure of one in the Pox, you must bathe him a good while, purge, and bleed him for Preparation of the humours, to the end that *Mercury* finding them more fluid, may be able to unite with them the more easily, and so carry them off. This *Mercury* must be administered by little and little at first, afterwards the Dose is augmented according to the strength of the Patient, and when the Jaws begin once to ache, you must give no more, unless it be now and then for continuation of the Flux. They spit commonly three Weeks together, but if it doth not by that time stop of its own accord, you must endeavour to stop it with Deterfive Gargarisms.

It

It happens sometimes that the Salivating vessels dilate and open so extreemly by the Corrosive Salts which caused the Salivation, that they cannot be closed again by any kind of Gargarism, and then the Brain dries up by little and little, and Death is the consequent of all; wherefore you must have a great care of not letting the Flux run too long.

I could attribute the invention of this discourse to my self, being the first who have thus treated of this matter in *France*, and maintained it in publick meetings; but I am not possessed with that vanity of Authors, I leave it to those who love it: I had no affectation to make a *Book on purpose* concerning it, but have only mentioned it as a thing incident to the Subject I treated of. I shall only say by the by, that those who make pretence of first finding it out, have hapned to make their complaints a little too late, having Printed their *Book* a year after mine, and three years after I held a *Publick Discourse* of it at *Monsieur de Launay's*, not to speak of what I taught a long time before in the first *Courses of Chymistry* that I shewed.

Some thinking to invalidate what I have hereupon established, do say that *Mercury* cannot be absolutely called an *alkali*, because the *alkali* that is in *Mercury* is but one part of its Composition, and is not to be separated from its other parts.

To Answer this difficulty, you need but only read in the *Remarks* that I have made upon the *Principles*, how it is that I do explicate the nature of an *alkali*, and you'll find that although the *alkali* comes from the Salt of a Plant called *Kali*, that is, *seapwort*, yet all bodies that cause a sudden

Effervescency with *acids* are called *Alkali's*, without any need of their containing any *Alkali salt* within them. So that I have no need to enlarge this *Book* without reason, by Answering all the little *Objections* that have been made to me upon the supposition of *Mercury's* being a pure *Alkali*. It is likely enough that those who have rais'd them, have not read with attention what I have said in my *Remarks* upon *Mercury*. For there they might find Solutions enough. I shall speak nevertheless to some of the Principal ones.

First, It is Objected that if *Mercury* be an *Alkali*, and the Venereal venom an *acid*, this same *acid* should certainly fix it, whereas the Dissolutions of it that are made by the Juices, do only serve to encrease its *Volatility*, and render it *Corrosive*, instead of being at all sweetned by it.

I Answer, it is as false to say, that *Mercury* is *Volatilized* by the Acid juices of the Venereal venom, as it is that *Mercury* mixed with Acid Spirits to render it *Corrosive*, should be *Volatilized* by the same Spirits. On the contrary, *Mercury* alone does easily *Volatilize* by the heat of the body, and nothing but Acids are able to fix it at all. I thought I had sufficiently explicated my self as to this, when I said that sometimes *Mercury*, finding not in the body enough Acid Spirits to fix it, does pass by *Transpiration*, &c.

As for the *Corrosive* nature that the *Mercury* assumes, we must attribute it to the Disposition of its Pores, and the abundance of Acid points it is impregnated with; and seeing it will not sweeten the Acidity of Salt and *Vitriol*, with which it is mixed to make *Sublimate Corrosive*, why should we

we expect it to sweeten the Acid juices of the body? I do not pretend nevertheless that it never Dulcifies at all; for I do conceive it may destroy much of their force by dividing and breaking their points, when the Acids are but few, as does happen in *Mercurius dulcis*.

Secondly, It is Objected that if the venom of the *Pox* were an Acid, it might then be Cured by the use of *Alkali Salts*, either fixt or Volatile, as by *Crabs-Eyes*, *Pearl*, or *Coral*, and such like bodies as are wont to kill and sweeten Acid humours.

I Answer, we often find that *Volatile salts* do give some ease to those that are troubled with the *Venerical distemper*, whether it be by opening the Pores, and so making the subtiler part of it perspire away, or that by being *Alkali's*, they do absorb some part of it. For this reason some do use to give their Patients the *Volatile Salt of Vipers* several mornings together, but these *Alkali's* are in truth of too weak a nature to carry off such an *Acidity*, after they are impregnated with it, as *Mercury* is able to do without losing its nature. They are *Nets* of too fine a make, to catch such keen and active bodies; if these *Salts* do destroy some part of the *Acidity*, they destroy themselves likewise in the conflict, so that they can have no further operation, wherefore there's need of a more powerful *Volatile Alkali* than these *Salts* are, to eradicate the *Acidity* of the *Venerical poison*.

As for *Fixt Salts*, and *Alkali* bodies, as *Pearl*, *Coral*, *Crabs-eyes*, whereas they have no *Volatile* quality in them, and their tendency is wholly downwards, it is very uncertain whether ever they reach to *Venerical tumours* (which commonly
rise

rise in the *Joints*,) by reason of the long way they have to pass thither, and the *Juices* they have to encounter with in their passage, which may in all likelihood change their nature ; but suppose they were carried to those *Tumors* with the same qualifications with which they were taken, they would only serve to weaken a little this *Acidity*, without being able to carry it off, and so they would only give a little ease, without removing *Radically* the *Ferment* of the Distemper, as *Mercury* is able to do.

It may be further asked why *Sublimate* does not fill the substance of the *Brain* with *Ulcers*, as well as it does the *mouth*.

I Answer that this *Sublimate* being in the *Brain*, finds it self so clog'd with a Mucilaginous moisture, that it is fain to lose there some part of its *Acidity*; so that it can do nothing else but cause a *Fermentation*, which makes the *Phlegm* purge away through the *Salivating vessels*; and this it is that causes the *Spittle* of those who have a *Flux*, to be so sharp and stinking.

This sharp *Phlegm* may also, as it passes in the *mouth*, encrease the number of *Ulcers*, for the *mouth* is as it were the *sink* of the whole body upon this occasion.

Sublimate Corrosive.

Sublimate Corrosive is a *Mercury* impregnated with *acids*, and raised by fire to the top of the vessel.

Put

Put a pound of *Mercury* revived from *Cinnabar* into a Matrafs, pour upon it Eighteen ounces of *Spirit of Niter*: Set your Matrafs in Sand a little warm, and leave it there till it be all dissolved; pour your dissolution, which will be clear as water, into a glass vessel or earthen pan, and evaporate the Liquor gently in Sand, until there remains a white Mass, which you must powder in a glass mortar, and mix with a pound of *Vitriol* Calcined white, and so much Salt decrepitated: put this mixture into a Matrafs, whose two thirds at least remain empty; place your Matrafs in Sand, and begin with giving a small fire, which you must continue so for three hours, then encrease it with coals to a pretty good strength, there will arise a *Sublimate* to the top of the Matrafs; the Operation must be ended in six or seven hours, let the Matrafs cool, then break it, avoiding a kind of Farine or light powder that flies into the air when the matter is stirred; you'll have a pound of very good *Sublimate Corrosive*, keep it for use.

The red *Scories* that are found at the bottom, must be flung away as useless.

This *Sublimate* is a powerful *Escharotick*, it eats proud flesh, and cleanses old Ulcers very well. If half a drachm of it be dissolved in a pound of Lime-water, it turns Yellow, and makes that which is called *Phagedenic Water*.

Remarks.

Remarks.

There needs not half the *Spirit of Niter* for dissolving a pound of *Mercury*, as there does for the same weight of *Bismuth*, although the pores of this last be much the larger, and the parts more disposed for separation; the reason of which is, that the *Mercury* being *Volatile*, and very diffused in its parts, it will divide almost of it self, and is held up more easily by *Acid Spirits*, than another body can be whose parts are more united, and whose tendency is downwards, such as *Bismuth* is.

When the dissolution of *mercury* is a making, there appears a great ebullition in the Matraass accompanied with Red vapours; also the heat is so very strong, that a man cannot endure his hand upon it: all this great stir proceeds from the *Acids*, which meet with resistance in their penetration of this body; for jostling one against another, they heat the liquor, and cause some part of the *Spirit of Niter* to evaporate away in red clouds, as it uses always to do when it rarifies. When the *mercury* is all dissolved, the dissolution clears up and cools, because the edges of the *Spirits* are all sheathed in the *mercury*, whence their motion comes to be interrupted and cease; and this is a thing so true, that if you should by way of curiosity distil this dissolution, you would draw off only a weak *acid*, for the greatest part of the edges do remain involved with the *mercury* in a white mass.

That

That which proves this Remark is this, that the white mass which is drawn from the Solution of sixteen ounces of *Quicksilver* in eighteen ounces of *Spirit of Niter* does weigh at least two and twenty ounces, that is to say, six ounces more than the weight of the *Quicksilver*. Now this augmentation cannot proceed from any thing else but the *acid Spirits*.

This mass is exceeding *Corrosive*, by means of the same *acid Spirits*, which become very active whereever they are met with.

If instead of *Spirit of Niter* we should use *Aqua fortis* to dissolve the *Mercury*, the Solution would become clear like the other, but there would be this difference between them, that when we have evaporated about a fourth part of the liquor in a glass-body in Sand, the remainder would be as red as *Claret wine*, and if we should let the liquor cool, there would appear in it white Crytals in form of long needles, and the liquor would still retain its red colour.

I conceive that the Solution acquires this colour from the Sulphurs which remain in the *Aqua fortis*, for the Sulphureous parts being in great motion may often turn and whirl about the insensible parts of *Mercury* round their center. Now it is easie to Remark by abundance of Experiments, that the red colour is a consequence of the great attenuation, or disposition to circulary motion, which the matter has received. But the Solution which is made with *Spirit of Niter* does not become red, because there is no Sulphur in this Spirit, or else there is not enough to do it.

You

You might perform this Operation by only mixing crude *Mercury* with Salt and Vitriol, without taking the pains to dissolve it with *Spirit of Niter*, but you would be an intolerable while incorporating them together, so as to make the *Quicksilver* imperceptible. Moreover there rises up a dust to the Nose that is very unwholsom: that which we aim at therefore by dissolving it, and reducing it into a white Mass, is only to prepare it for an easier mixture.

In the Sublimation I have described, the *Mercury* loads it self with as many Acid Spirits as it is able to contain; these Spirits are a kind of load to it, and restrain its great Volatility, so that it doth not evaporate quite away, as it would do if there were nothing to withhold it, but it only *Sublimes* to the upper part of the Vessel in fair white Crystals that are called *Sublimate Corrosive*; the Mass that remains at the bottom of the Matrafs is nothing but a mixture of the Terrestrious parts of Salt and Vitriol; it weighs eight and twenty ounces.

Some will needs blame this preparation of *Sublimate Corrosive*, by saying, that when it is used to the making *Mercurius dulcis*, the *Spirit of Niter* ought to be suspected by reason of its acrimony, and particularly its *Saline Sulphureous* parts.

But by performing this Operation, the way that I have described, there will be no need of retaining any scruple upon this account, because the *Sublimate* can't be made, without an evaporation of many red vapours through the entrance of the Matrafs, for three hours time at the least, and these

these vapours can be nothing else but the *Spirits of Niter*, for so small a fire is not able to separate and raise so high the *Spirits of Salt* and *Vitriol*. Thus there is no need of fearing these *Saline Sulphureous Spirits*, with which *Spirit of Niter* is thought to be well stored, because they being of a *Volatile* nature must necessarily come before the others. But supposing that *Spirit of Niter* did still remain in the *Sublimate Corrosive* of which we make our *Mercurius dulcis*, I see no reason why we should apprehend more hurt from their acrimony than from the other *Corrosive Spirits*, because few men scruple to give this *Spirit* itself inwardly, in potions for the *Colick* and other diseases, and they give divers Preparations made with this dissolvent, such as *white Precipitate*, and many *Precipitates* of Gold and Silver, without any visible harm. But that which is most remarkable, is, that even those who cry out upon this Preparation for being made with *Spirit of Niter*, do nevertheless themselves recommend and use much a *Mercurius dulcis*, which they make by *Subliming* white *Precipitate*, that is prepared with *Spirit of Niter*.

The *Corrosion* of *Sublimate* does proceed from the edged Acids which do fix in the body of *Mercury*, and it may be said with great probability, that this metal always retaining a round figure, (let it be divided never so subtilly) does rarifie by the heat of fire into an abundance of little balls which the acid *Spirits* do fix into on all sides, and so interlace themselves in it, that they hinder its rising higher, and do together make one body that is called *Sublimate*. But when this *Sublimate* is applied

applied to flesh, the heat and moisture of it do set in motion the *Mercurial* parts, and the motion of the little balls being once raised, they rowl about with great fury, and tear the flesh with the edges they contain, which are like so many little knives cutting whereever they touch; from whence it comes to pass, that if the *Sublimate* should be taken inwardly, it kills in a very little time; the humidity which does always accompany and soften our flesh, gives it a greater hold than otherwise it would have, which is the reason why *Sublimate* does act with that celerity it does upon a soft moist part rather than a dry: nay it is often wetted with a little water, to make it work the more quickly.

By this Remark may be explicated, why the *Lapis infernalis*, which is a Silver filled with the edges of *Spirit of Niter*, has not so violent an effect as *Sublimate Corrosive*; because the parts of Silver have no such aptitude to rowl to and fro, and to rise, as those of *Mercury* have; for which reason it is likewise, that it does not make so great an Eschar as the *Sublimate*, although it does contain at least as much *Spirit of Niter*, as the other.

And thus a reason may be given, why even six grains of Crystals of Silver may be given by mouth without any danger, whenas not two grains of *Sublimate* can be given without a manifest danger, because the Crystals of the Moon have not that circulary motion in their parts, as *Sublimate* has, all their tendency is only downwards, and all that they can do is to purge by their Acidity.

When *Sublimate Corrosive* is dissolved in Lime-water, the water presently turns yellow, as is seen in the *Phagedenick water*, and it loses so much

much of its Corrosive quality, that it may be given inwardly after that, without fear of poisoning; and the reason of this is, that the greatest part of the acid points strike off from the *Sublimate* to enter into the *alkali* of Lime which is a more porous body; so that the *Mercury* losing some of its most keen acids, becomes the less *Corrosive*.

It will not be amiss to acquaint you here, that you'l often meet in the Shops of Druggists with a *Sublimate Corrosive* made of *Arsenick*; Now to know the truth of it, you must only rub it with a little *Salt of Tartar*, and if it turns black; there is *Arsenick* infallibly in it; on the contrary if it turns yellow, it is good.

Those who have thought fit to Criticize upon what I have said about the effects of *Mercury*, would methinks have spoken more to the purpose than they have done, if they had objected to me one difficulty that I have made my self since the first Edition of my Book, and which has seemed to me to be the greatest that can be made on this subject. It is this: If the *Mercury* that is given in order to raise a Flux, does joyn with the acid salt of our humors, and so does make a *Sublimate Corrosive*, after the same manner as it does in the Matrafs, when it is mixt with *Salt* and *Vitriol*; this *Sublimate* of the body cannot be well made, so long as there is any watry humor in the part, wherein the *Mercury* is mixt with the acids; just as none of it can be made in a Matrafs, until all the Phlegm that's in it, is evaporated away. Now it is not to be conceived, that there should ever happen such a Desiccation of humours to the body, for it would be Corroded by the *Mercury* so

loaded with acids, before it could *Sublime*.

To answer this Objection I say, That although I have made a comparison between the *Sublimation* of *Mercury* that's made in the body, and that which is done in a Matrafs; nevertheless there is this difference between them, that the first is not only made with *Salts* extremely volatile, but is likewise assisted or carried on by the motion of the humours with all their humidity up to the head, whereas this other is made with *fixt salts*, whose acidity is so strongly rooted in the Earthy part, that it cannot be separated from it, without a very considerable fire.

Nor must we think that the *Mercury* in the body is loaded with as many and as strong acids, as that in the Matrafs; for if it were so, it would carry destruction, and cause a *Gangrene*, where-soever it came; but it is enough, that its *Pores* are in part impregnated with them, sufficient to diminish a little of its volatility, and cause those prickings and pains which do happen during the *Salivation*.

If you dissolve *Sublimate Corrosive* in Water, then Filtrate, and separate the filtred liquor into two Viols, and cast into one of them some drops of the *Oil of Tartar* made *per deliquium*, you'll presently have a *Red Precipitate*, that you may dry and use. Then if you drop into the other Viol the volatile Spirit of *Sal Armoniack*, you'll have a fine *white Precipitate*, of the same virtues with that I shall describe anon.

Because *Sublimate Corrosive* is so great a *Poison*, I have thought it not amiss to speak here of the *Counterpoisons* that may be given to such persons who

who by misfortune have taken it. But lest some may imagine that *one and the same Antidote* can serve for all sorts of *Poisons*, as the *Mountebanks*, and *Sellers of Orvietan* do pretend, and endeavour to perswade; I shall say something of *Poisons*, and their differences.

Whatsoever is able to break and destroy the Oeconomy of the body, and the orderly connexion or derivation of humours, or else to hinder the natural course of the Spirits, is really a *Poison*.

It may be taken, or received two ways; the one outward, as when the Pestilence and many other Malignant diseases (which do proceed from an infected air) do seize upon a man; or when one is bit or stung by venomous beasts. The other inward, as when a man takes *Arsenick*, *Sublimate*, *Hemlock*, *Woolfsbane*, &c.

The same Poison does not kill all sorts of Animals; as for example, the *Nux Vomica* is a Poison to dogs, and yet does many other beasts no hurt at all. The smoke of *Tabaco* does kill *Vipers* in a very little time, although there is hardly a creature that has more life than the *Viper*, and that this smoke will only give a little purging to other creatures. The water in which *Quicksilver* has been infused will kill Worms, and yet does good to other animals. *Arsenick* soon kills a man, and many other creatures; and it will only purge a *Wolf*, and render him more lively than he was before.

All these different effects can only proceed from a diversity of natures, and a difference of humors; for that which is able to tear and destroy one sort, will cause only a light Fermentation in others.

We must consider two sorts of effects in Poisons; the one does coagulate the blood by degrees, as that of the *Viper*, the *Tarantula*, Hemlock, Wolfsbane, &c. and whereas these do hinder the motion of the Spirits by this coagulation, the Animal falls into Convulsions, and dies soon after: much after the same manner as it happens when some acid liquor is syringed into a Vein, or Artery.

The others, such as *Sublimate*, and *Arsenick*, do tear and excoriate the *viscera* by their pungent Salts, until they come to gangrene, and then they dye.

The Medicines which are very properly given to obviate the accidents caused by the first poisons I now mentioned, are volatile Salts, Treacle, Mithridate, Orvietan, and an infinite number of other remedies of this kind. *Vipers* flesh, and the flesh of *Scorpions* do cure the poison themselves do give, as I shall shew hereafter, when I come to speak of the *Viper*. And hereupon the Reader will not take it amiss, if I give him a short story that is very pertinent to this subject.

One day I put two living *Scorpions* into a glass-bottle, and then added a little Mouse to their company. Which Mouse running over the *Scorpions* provoked them to bite her till she cried out. Half a quarter of an hour after, I saw her dye of Convulsions. Some hours after this, I threw in another Mouse (a little bigger and more active than the first) to the same *Scorpions*. She leapt upon the *Scorpions* as the other had done before, and was bit by them in like manner, she cried aloud, and was so provoked to revenge her self, that she eat up both the *Scorpions*, leaving only the head and the

the tail. I would needs observe the end of this Tragedy; I left the Mouſe in the bottle, four and twenty hours, and during all that time ſhe had not the leaſt appearance of being hurt, and was only concerned at the being imprifoned. I intended to have diſſected her, in order to ſee whether there were no change in the parts, or in the blood: But a ſtander by hapning to take up the bottle too careleſly let it fall, and broke it, ſo the Mouſe eſcaped. Now the Volatile ſalts which were in the *Scorpions* fleſh, might be ſaid by their active power to hinder the coagulation of the blood, which would ſoon have been in the veins of the Mouſe, after ſhe was bit; but let every body explicate this experiment according to his own principles, I ſhall reſume the thread of my diſcourſe.

The remedies which ought to be given to obviate the effects of *Arsenick*, *Sublimate*, and other corroſive poifons are of a contrary nature to thoſe I now mentioned; for inſtead of agitating the maſs of blood, and adding new heat to all the body, as thoſe do, theſe muſt calm and quiet the violent agitation of humors, and ſweeten the acrimony of its ſalts.

Therefore you muſt, ſo ſoon as you can, make the Patient take a porringer of old Oil of Olives, in order to make him vomit; freſh butter, fat, and all unctuous things will very properly be given, becauſe they do not only purge away the poifon both upwards and downwards, but likewiſe (which is a thing very conſiderable) they conſiſting of unctuous ſlimy parts do blunt and dull the edge of thoſe ſalts which remain of them in the body. You muſt afterwards make him drink warm

milk, and continue the use of it several days, after which you must purge him.

The effect of *Sublimate Corrosive* is much quicker than that of *Arsenick*, because its acids being presently set to work by the heat of the body, and by the volatility of *Mercury*, do tear and cut in pieces all that is in their way. Wherefore if remedies be not immediately given, after the poison is taken, the person is in a most deplorably dangerous condition.

What has been here said does shew, that it is exceeding necessary for a man to understand the nature of the poisons which are taken, before he presume to give a Counter-poison, or Antidote, and that a box of *Orvietan* must not be esteemed a sure Antidote in all cases.

And hence it is plain, that if the Quacks and Mountebanks, who shew upon stages, should offer to take *Sublimate*, or *Arsenick* by mouth, in order to try the virtue of their remedies, as they pretend to do, all the *Mithridate* they have would never be able to save them. And supposing they did not understand their *Legerdemain* tricks well enough, but should be constrained to swallow such poisons as these, you must not think them such fools as to keep to the remedy they recommend, which would be sure to do nothing else but increase their misery by its acrimonious heat. They would have recourse to the Oil, and other fat substances, to avoid death, which otherwise would certainly follow.

Sweet Sublimate, or Mercurius dulcis.

Sweet Sublimate, is a *Mercury* reduced to a white mass by some broken edges of acids.

Powder sixteen ounces of *Sublimate Corrosive* in a marble or glass mortar; mix with it by little and little twelve ounces of *Mercury* revived from *Cinnabar*: stir this mixture with a wooden Pestle, until all the *Quicksilver* becomes imperceptible; then put this gray powder into several Viols, or into a Matrafs whose two thirds do remain empty; place your vessel in Sand, and give but a little fire at first, then augment it unto the third degree: continue it in this condition until your *Sublimate* is made, which usually happens in four or five hours. Break your Viols, and sling away a little light earth that's found at bottom: separate also that which sticks to the neck of the Viols, or the Matrafs, and keep it for Unguents against the Itch, but gather up carefully all that is in the middle, which is very white; and having powdered it, resublime it in Viols or a Matrafs as before; separate once more the matter in the middle, and resublime it in other Viols, as before, this third time; lastly, separate the terrestrious matter at the bottom, and the Fuliginous that lies in the neck of the Viols, and keep the *Sublimate* that is in the middle, for it is sufficiently dulcified. Its use is for all sorts of Venereal diseases, it opens obstructions, and kills the Worms, the Dose is from six unto thirty grains in Pills; it purges gently by Stool.

Remarks.

You must observe never to powder *Sublimate Corrosive* in a mortar made of metal, because it would corrode it, and carry off some part, which would spoil the operation; glass, marble and stone mortars are more convenient, because they can communicate no ill impression to the matter.

Many have written that we should use equal parts of *Sublimate* and *Mercury*, but they did not consider that so great a quantity of *Mercury* could not be here used, and that when the *Sublimate* hath received near about the quantity I have appointed, the rest will remain unmixed.

When a matrafs is used for this operation, half its neck must be cut off before-hand; for when it is performed in common matraffes, a great part of the Fuliginous matter not being able to rise high enough falls down again on the *Sublimate*, and hinders it from becoming sweet, because this Fuliginosity contains the more acrimonious part, whereas it will easily fly out of Viols, or matraffes with a short neck. Two thirds of each vessel must remain empty, otherwise the *Mercury*, which rarefies like a Spirit, would be apt to break them. That which sticks to the neck of the Viols being too acrimonious to be used inwardly may serve for Ointments against the Itch and Tettars.

Sweet Sublimate rises more easily than the *Corrosive*, because it is less loaded with acids.

The *Sublimate* that is made in a matrafs, loses half an ounce each *sublimation*; so that an ounce and

and a half is lost in three times, when the operation is done.

Six drachms of *Scories* and light earth are found at bottom, and consequently there is but two drachms of matter carried off each *Sublimation*. But if you try this operation in Viols, the *sublimate* loses half an ounce more, as having a larger aperture to fly out at, than in a matrafs, or long neck.

It seems a little strange at first that so strong a Poyson as *Sublimate Corrosive* should be reduced into so mild a remedy, by the addition of nothing but *Mercury*. But you ought to wonder no longer, when you consider that those Spirits which caused the Corrosion were then shut up in a strait room, but being now divided and enlarging their quarters, cannot in reason act with such force; besides that by the repeated action of fire the subtler part of their points is blunted against the body of *Mercury*.

The Purgative quality of sweet *Sublimate* does consist in the acids that remain; wherefore if you should sublime it twice or thrice more, the *Sublimate* would not be at all Purgative, but only Sudorifick. And it is then more proper to raise a Flux with than it was before; for having lost those salts which by irritating the stomach and guts did render it Purgative, it is the more disposed for rarefaction in the body, and so to joyn with the ferment of Venereal Tumors.

Mercury prepared any way whatsoever ought to be taken inwardly no other way than in Pills, but by no means in potion, for fear it should stick in the Gums, and so spoil and loosen the Teeth.

White

White Precipitate.

White Precipitate is a *Mercury* dissolved by *Spirit of Niter*, and precipitated by salt, into a white powder.

Dissolve in a Glass-Cucurbite sixteen ounces of *Mercury* revived from *Cinnabar* with eighteen or twenty ounces of *Spirit of Niter* : when the dissolution is made, pour upon it salt-water filtrated, made of ten ounces of sea-salt in two quarts of water ; add unto this about half an ounce of the volatile *Spirit of Sal Armoniack*, there will Precipitate a very white powder, that you must leave for a sufficient time to settle ; then having poured off the water by Inclination, wash it several times with Fountain water, and dry it in the shade. It is used to raise a Flux with, the Dose is from four to fifteen grains in Pills. It is also used in *Pomatus* for Tettars and the Itch, from half a drachm to two drachms, for an ounce of *Pomatum*.

Remarks.

Although I do recommend eighteen or twenty ounces of *Spirit of Niter* for the solution of sixteen ounces of *Mercury*, yet you must know that it is not very necessary to keep too strictly to this same quantity. You may use either a little more, or a little less, according to the strength of the Spirit, or according as it is more or less dephlegmated. I my self do commonly use but an equal

equal weight of it with the Quick-silver, because the *Spirit of Niter* I do use is exactly dephlegmated. You might likewise use *Aqua fortis* instead of *Spirit of Niter*.

The Dose of *white Precipitate* must be less than that of sweet Sublimate, because it retains more acid Spirits; but if you would Sublime this *Precipitate* alone in a matrafs, in a gradual fire, you'd obtain a Sublimate as sweet as the other; because the fire having acted upon it, breaks most of its points, and then it may be given in as great a Dose as ordinary *Mercurius Dulcis*.

If you desire to make this *Precipitate* exceeding white, you must dissolve the *Mercury* in a vessel whose mouth is very large, that so the red vapour of the *Spirit of Niter* may fly out the more easily. When the dissolution is made without the help of fire, the *Precipitate* is the whiter.

The Precipitation of *Mercury* may be made with the *Spirit of Salt*, as well as the salt in substance.

This is not so easily made, as that of *Bismuth*, because the pores of *Mercury* being smaller than those of *Bismuth*, do retain with more force the acids which are fixt into it. Moreover Quick-silver being of a volatile nature does remain suspended in the liquor more easily than *Bismuth*, which is a body altogether fixt.

It may well seem strange that an acid salt, such as sea-salt, should be able to precipitate that which the acidity of *Spirit of Niter* had dissolved. To resolve this difficulty, you must know that, though our Senses tell us that acids do all perform the same effect, which is to prick and to pierce, yet nevertheless they all do differ in the figure of their points;

points; for according as they have received more or less fermentation, they have also consequently their points more subtile, sharp, and light; and this is attested not only by taste, but the sight also; for if you should CrySTALLIZE the same body, by dissolving several parts of it in several vessels by Spirit of Salt, Spirit of *Niter*, Spirit of *Vitriol*, Spirit of *Alom*, and by Vinegar, you'l observe so many kinds of Crystals different in figure, as there were different dissolutions. The Crystals made by Vinegar will be more sharp than those prepared by Spirit of *Niter*; those made by Spirit of *Niter* will be sharper than those by the Spirit of *Vitriol*; those made by Spirit of *Vitriol* will be sharper than those by the Spirit of *Alom*; but of all these Crystals none will be found to have grosser parts than those prepared by the Spirit of Salt; for these Crystals do all retain the figure of their constituent parts. This now being supposed, it will be an easie matter to explicate our Precipitation, for the salt or its spirit containing points more gross or less delicate than those of Spirit of *Niter*, and falling on this dissolution, do move, jostle, and easily break the points impregnated with the body of *Mercury*, and so do make them let go their hold, whence it comes that *Mercury* precipitates by its own weight.

The same Principle may serve to explicate, why *Lead* dissolved in *Vinegar* precipitates by means of the Spirit of *Vitriol*, or Salt.

You must observe not to make the water too salt, for then the great quantity of salt would hinder the *Mercury* from precipitating.

The

The Volatile Spirit of *Sal Armoniack* containing an alkali salt, does much help the *Precipitation*, for its agility carries it into every recess of the liquor, where the sea-salt, whose parts are not of so active a nature, was not able to go: which is proved from hence, that if you use only sea-salt dissolved in water to make this *Precipitation* with, it will then happen that if after pouring off the clear liquor, which swims upon the *Precipitate*, into another vessel, you drop the Spirit of *Sal Armoniack* into the liquor, there falls a considerable quantity of *Mercurial Precipitate*, which may serve like the other. If instead of the volatile Spirit of *Sal Armoniack* you'd use the *Oil of Tartar* made *per Deliquium*, the *Precipitate* would then be reddish.

Two objections have been made against my manner of explicating the *Precipitation*, of such matters as Spirit of Niter had dissolved, made by Sea-Salt.

First they say, it is not proper to make the jostles and encounter of salt-water with Spirit of Niter loaded with bodies which it had dissolved, to be the cause of its precipitation; whereas the most violent jogs that can be given to the solution, either from an arm, or with matters much more heavy and solid than sea-salt, are not able to cause the precipitation.

This Objection will raise no difficulty to any that are a little skill'd in Natural Philosophy: for although I have said, that by reason the edges of sea-salt are grosser than those of Spirit of Niter, the sea-salt does precipitate what Spirit of Niter had dissolved and suspended; I never meant that
if

if these edges were as big as a mans arm, they would do it the better. It is sufficiently known that there must be a proportionable subtilty of parts between the dissolvent and that which does precipitate, and that the edges of an acid must be otherwise treated than with a cuff of the fist, in order to make them let go their hold. But I intended to make it appear that if sea-salt does jog and shake the edges of Spirit of Niter, it does it by dividing into very minute parts, and thereby entering into the pores of the phlegm, which it would not be able to do if these parts were as big as a mans arm, or were like the solid heavy matters now spoken of.

Secondly, if the grossness of the edges of sea-salt, or the shock they give, did make the precipitation of substances dissolved by Spirit of Niter, we should expect afterwards to find the first, with its gross edges separated from those of Spirit of Niter; whereas upon evaporating and crystalizing the liquor, their edges are indeed reciprocally confounded the one with the other, making together a new body.

I answer, that the shock and jostle which the edges of sea-salt do give to Spirit of Niter, when loaded with some bodies, does not hinder the edges of Spirit of Niter remaining after the precipitation, from uniting with the sea-salt, by which union the Crystals do become confused.

I shall here add one preparation more, that is very proper to raise a Salivation with.

Take an ounce of the solution of *Mercury* made in Spirit of Niter, put it into a glass-vessel, and pour upon it three or four and twenty ounces of
water,

water, all the liquor will turn white, let it settle until it becomes clear, filtrate the liquor, and keep it for use.

This water may be given from half an ounce to an ounce, in a glass of *Prisan*, or broth. It vomits gently, and provokes a Salivation; some do drink half an ounce of it to cure the itch, but they ought to be purged and bled before-hand.

Red Precipitate.

This preparation is a *Mercury* impregnated with Spirit of Niter, and calcined by fire.

Take eight ounces of *Mercury* revived from *Cinnabar*, dissolve it in a sufficient quantity of Spirit of Niter, which is eight or nine ounces; pour the dissolution into a Viol, or Matrafs with a short neck, set it in Sand, and evaporate all the moisture with a gentle heat, until there remains a white Mass; then quicken the fire by little and little to the third degree, and keep it in this condition till all your matter is turned red, then take it off the fire, let the Viol cool, and break it to obtain your Precipitate, which weighs nine ounces.

It is a good Escharotick, it eats proud flesh; it is used for the laying open of Chancres, mixt with burnt Alom, *Egyptiacum*, and the common Suppurative. Some do give it inwardly to four grains for to raise a Flux with, but this is dangerous, unless rectified Spirit of Wine be burnt two or three times upon it.

Remarks.

Remarks.

This Preparation is improperly called *Precipitate*, here being no Precipitation at all.

Many Authors have thought they could much encrease the redness of this *Precipitate*, by *Cohobating* it, or distilling Spirit of *Niter* three times upon the white mass; but I have found by experience both ways, that these Circumstances are of no use.

The white Mass which remains after Evaporation of the humidity is a mixture of *Mercury* with a great many acid Spirits, for it weighs three ounces more than the *Mercury* did which was dissolved; it is extreme Corrosive, and fiery, if applied to the flesh, but according as it is Calcined in order to make it red, the edges of the Spirit of *Niter* which caused the Corrosion do strike off, and fly into the Air; whence it comes to pass, that the more we desire to encrease its redness by Calcination, the less it weighs, and the less it corrodes. Some Chirurgeons observing this effect do choose the *Precipitate* that is not so red as usual, when they would make an Eschar quickly.

If you still continue the fire some hours under the red mass, it will sublime, and still retain its colour; this sublimate is not so Corrosive as the other; which makes me think that the points of Spirit of Salt are necessary to make a sublimate very Corrosive. The reason why it sublimes, is because the *Mercury* being delivered from a great many acid Spirits, which did fix it, has power to rise

rise with those that remain. But because these remaining Spirits do moderate a little its volatility, it makes a stop in the middle of the Viol.

Some do put red *Precipitate* into an Earthen Pot, and pour upon it Spirit of Wine well rectified, then fire it, and when the Spirit is consumed, they add more, and burn it as before; they repeat the adding Spirit of Wine, and burning it six times, and then call this Preparation *Arcanum Corallinum*. The Spirit of Wine by burning does carry off some edges of the *Precipitate*, and joyns it self to the rest, so that this *Precipitate* is sweetened and rendred fit to be taken inwardly.

If by way of curiosity you pour Spirit of *Vitriol* upon common red *Precipitate*, such as I have described, a dissolution will soon follow, because Spirit of *Vitriol* joyning with the Spirit of *Niter* that remained in the *Precipitate*, an *Aqua fortis* must happen from their union, which is able to dissolve imperceptibly the parts of *Mercury*; but this dissolution will happen without any *Ebullition*, because the *Mercury* has been already rarified by an acid, so that the Spirit of *Vitriol* does only dissolve them without making any commotion. The solution is clear like other solutions of *Mercury*, without any appearance of redness, and the same Preparations may be made with it, as are used to be by the solution of *Quicksilver* in *Aqua fortis*.

If instead of Spirit of *Vitriol* you pour Spirit of *Salt* upon the red *Precipitate*, it turns presently into a curious white, because the Spirit of *Salt* does break the force of the Spirit of *Niter* that was in the red *Precipitate*; and the same thing must happen here as does when Spirit of *Salt* is poured upon

the solution of *Quicksilver*; for although red *Precipitate* be a dry body, yet it is nothing else but a mixture of *Quicksilver*, and Spirit of *Niter*.

I have given the reason why Spirit of *Salt* comes to weaken Spirit of *Niter*, in my Remarks upon white *Precipitate*.

As for the sudden change of colour, it is indeed somewhat strange, that a matter which is grown red by *Calcination*, should in a minutes time turn so exceeding white.

This Effect can be attributed only to the dislocation which the acid spirit of *Salt* does cause in the parts of red *Precipitate*, and to the disposition it puts them anew into, so that their *Superficies* is put into a capacity of reflecting the light in a right line to our eyes, to give the appearance of a white colour; for if by means of another sort of liquor, or else by fire and some alkali body, the disposition of the parts of your *Precipitate* is again changed, it will obtain some other colour, or else it will return and revive into *Quicksilver*.

If you pour the volatile spirit of *Sal Armoniack* upon red *Precipitate*, it turns into a grey powder, but if you throw a great deal of water upon it, it becomes a milk, though none of the whitest. The same thing happens, when you drop Spirit of *Sal Armoniack* into the solution of *Quicksilver* made with Spirit of *Niter*; for soon after the effervescency is over, a grey powder is seen to *Precipitate*, and if you add to it water, it becomes a milk of the same whiteness as the other.

Common red *Precipitate* then is subject to the same alterations as the solution of *Mercury*, the red colour giving no particular impression to it; which

which truly is a good proof that colour is no real thing, but wholly depends upon the modification of parts.

Turbith Mineral, or Yellow Precipitate.

This Preparation is a *Mercury* impregnated with the acidity of Oil of *Vitriol*.

Put four ounces of Quick-silver revived from *Cinnabar* into a glass Retort, and pour upon it sixteen ounces of Oil of *Vitriol*; set your Retort in Sand, and when the *Mercury* is dissolved put fire underneath, and distil the humidity; make the fire strong enough toward the end, for to drive out some of the last Spirits of all; afterwards break your Retort, and powder in a glass Mortar a white Mass you find within it, which weighs five ounces and a half; pour warm water upon it, and the matter will presently change into a yellow powder, which you must dulcifie by a great many repeated Lotions, then dry it in the shade, you'll have three ounces and two drachms of it. It purges strongly, both by vomit and stool, it is given in Venereal maladies, the dose is from two grains unto six in Pills.

Remarks.

Though that which is improperly called Oil of *Vitriol*, be the strongest and most Caustick acid of this Mineral Salt, it is nevertheless much weaker than Spirit of *Niter*, and so requires a

greater quantity of it, and longer time to dissolve the *Mercury* in, for there's much a-do to dispatch the solution in ten hours. That which is distilled is exceeding weak, because the *Mercury* retains the greatest part of the acid Spirits, and they are the things that purge so strongly although many of them be carried off by the Lotions.

All these Preparations are nothing but so many different shapes of *Mercury* made by acid Spirits, which according to their different adhesions, do cause such different effects.

All these *Precipitates* and *Sublimates* may be revived again into flowing *Mercury*, by mixing them with Lime, and distilling them, as I have said in the reviving of *Cinnabar* into Quick-silver, because the alkali of Lime destroys those acids that disguised the Quick-silver.

Oil or Liquor of Mercury.

This preparation is an acid liquor loaded with *Mercury*.

Put the lotions of the white mass, that *Turbith Mineral* was made of, into an earthen pan, or glass vessel, evaporate in Sand all the liquor, until there remains at bottom a matter in form of salt, which weighs two ounces and a drachm, put the pan in a cellar, or other cool place, and there leave it until this matter be almost all dissolved into liquor. It is used for the laying open Venereal Shancres, and eating the flesh, Pledgets being dipt into it.

Remarks.

Remarks.

This liquor is nothing but *Mercury* so penetrated and divided by the acid Spirits of *Vitriol*, that it can dissolve like a Salt: now for that it contains these corrosive Spirits, it eats and corrodes where-ever it touches, like unto a Sublimate Corrosive.

This liquor may be made with spirit of *Niter*, and then it will be more violent in its Operation, but because it would then pierce too much, and cause dangerous accidents, I would rather choose to prepare it with Oil of *Vitriol*.

If you drop a few drops of the Oil of *Tartar* made *per Deliquium* into this liquor, there will fall immediately a Mercurial Precipitate, because the alkali of *Tartar* will break the edges that held up the *Mercury* dissolved.

Another Oil of Mercury.

This preparation is a *Sublimate Corrosive* dissolved in spirit of Wine.

Powder well an ounce of *Sublimate Corrosive*, and put it into a Bolthead, pour upon it four ounces of Spirit of Wine well rectified upon salt of *Tartar*, stop well your Bolthead, and let it infuse cold, six or seven hours, the *Sublimate* will dissolve; but if any sediment remains at bottom, decant the liquor from it, and pouring upon the sediment a little more Spirit of Wine, infuse it

as before, to finish the solution, mix your solutions, and keep them in a Viol well stop'd.

This is an Oil of *Mercury* milder than the former, it is good in Venereal Shancres, especially when there is any fear of a Gangrene, you may use it with pledgets like the former.

Remarks.

Spirit of Wine well rectified can dissolve sublimate corrosive, but it is not able to dissolve Quick-silver, nor even *Mercurius dulcis*; the reason of which is, that the Sublimate being a Mercury extremely rarified, and already as it were suspended by acids, the Spirit of Wine insinuates into it by little and little, and dissolves its parts; but Quick-silver and *Mercurius dulcis*, consisting of parts too close and compact, the Spirit of Wine which is a rarified Sulphur, cannot give shakes strong enough to disjoyn or separate them.

This liquor is milder than the former, because Spirit of Wine, which is a Sulphur, does so blunt the acid edges of Sublimate Corrosive, that they cannot act with that strength they did when they were at liberty.

Other Precipitates of Mercury.

These preparations are only Sublimate Corrosive dissolved and precipitated into powders of different colours.

Mix

Mix 7 or 8 ounces of *Sublimate Corrosive* powdered, in a glass or marble Mortar with 16 or 18 ounces of warm water, stir them about for half an hour, then let the liquor settle, and pour it off by Inclination, filter it, and divide it into three parts to be put into so many Viols.

Pour into one of these Viols some drops of the Oil of *Tartar* made *per Deliquium*, there falls immediately a red *Precipitate*.

Drop into another of these Viols some volatile spirit of *Sal Armoniack*, and you have a white *Precipitate*.

Pour into the last of these Viols about a spoonful of Lime-water, you have a yellow water that is called *Phagadenick-water*, or a water for Ulcers, because it is good to cleanse and heal Ulcers, the Chirurgeons do frequently use it, especially in Hospitals; if you let the liquor settle, it will let fall a yellow *precipitate*.

To obtain these three *Precipitates*, you have only to pour off the clear water by Inclination, wash them, and dry them apart.

Red *precipitate* may be used like that I described before, but it is not so strong; it is the truest red *precipitate* of any.

The white *precipitate* has the same virtues as the other.

Yellow *precipitate* may be used in *Pomatus* for the Itch, half a drachm or a drachm of it is to be mixed with an ounce of *Pomatum*.

The *Sublimate* which remains at the bottom of the Mortar, being dried may be used in *Pomatus* for the Itch, like yellow *precipitate*.

Remarks.

Sublimate being a *Mercury* loaded with acids, common water is able to dissolve some of it, because these acids do rarefie it, and make a kind of salt of it; but because there are not acids enough in it to dissolve all the *Mercury*, the most compact part of it remains at bottom, the liquor is filtrated to clear and purifie it the more, it is as clear and transparent as Fountain water.

If by way of Curiosity, you should drop into the Viol of red *precipitate*, that I now described, some spirit of *Sal Armoniack*, and would shake the liquor a little, it would presently turn white, and your *precipitate* would be white; but if instead of spirit of *Sal Armoniack* you would use spirit of *Vitriol*, an *Ebullition* would rise in it, and the red liquor would become clear and transparent as common water.

Because the Oil of *Tartar* is an alkali salt dissolved, it breaks the edges of the acid which held up the *Mercury* imperceptible, and serv'd as Finns to make it swim in the water, so that this *Mercury* having nothing left to bear it up, must needs *precipitate* by its own weight. The same thing happens when spirit of *Sal Armoniack* is thrown upon the other part of the solution of *sublimate Corrosive*. For this spirit being in like manner an alkali, produces the same effect as the Oil of *Tartar*.

But although alkali's do all agree in this, that they break and destroy acids, nevertheless there is always some difference in their action.

And

And this evidently appears in those differently coloured *precipitates*, for this diversity can be attributed only to this, that they having in several manners wrought upon acids, do dispose and modify the parts of the precipitated body, so as they may be capable of making different Refractions of Light.

These *precipitates* are no longer poisons, though they come from *sublimate Corrosive*, and there's the same reason for it, as there is for the *precipitations*; for seeing that which gave the *Corrosion* was an acid, when this acid is destroyed by such powerful alkali's as are spirit of *Sal Armoniack*, and Oil of *Tartar*, that which remains must become sweet.

When spirit of *Vitriol* is thrown upon the liquor of red *precipitate*, there rises an Ebullition, because the acid does penetrate the alkali salt of the Oil of *Tartar*, and this alkali being destroyed, the acid dissolves what was *precipitated* before, whence it comes that the liquor clears up, and turns into poison as it was before.

If you would again pour Oil of *Tartar*, then spirit of *Sal Armoniack* upon it, there would happen new red and white *precipitates*, which might again be dissolved, and the liquor made clear again, by adding to it more spirit of *Vitriol*, but only a greater quantity of this Spirit must be used than was before.

CHAP. IX.

Of Antimony.

Antimony is a Mineral consisting of a Sulphur like unto common Sulphur, and of a substance near approaching to Metallick: it is called *Stibium* in Latin. It is found in many places in *Transylvania, Hungaria, France, Germany*. Sometimes you may meet with some of the mineral *Antimony* at the Druggists, that is to say, just as it is taken out of the Mines, but that which is commonly brought among us hath been melted, and moulded into cakes of a Pyramidal form.

You must chuse that which is in long shining needles, and not expect to find it of a reddish colour, as many Authors do advise; for in a hundred weight of this Mineral, you'l hardly find one piece of this kind. The occasion of this error came from the Alchymists, who thought that *Antimony* did contain a Sulphur like unto that of Gold, and that the reddish sort had more of it than the black; but this pretended Sulphur is as imaginary as that of gold. This reddish colour does doubtless proceed either from the heat of the Sun coming to it, or from a participation of the subterranean heat, bestowed more on such pieces, than the rest; for when the Sulphur of *Antimony* is rarefied, it assumes a red colour, as may be seen in the operation, called *Golden sulphur of Antimony*.

Antimony

Antimony will not dissolve, but with *Aqua Regalis*, which has made a great many Alchymists think, that this Mineral was an imperfect Gold.

Although nothing but a metallick substance mixt with Sulphur can be perceived in the analyzing of *Antimony*; nevertheless considering its Figure, somewhat like that of salt-peter, and its *Emetick* quality, which can proceed from nothing but a puncture made in the stomach, there is reason to think that it contains an acid salt; but because the edges of this salt are sheathed in a great deal of Sulphur, it cannot exert its activity, without opening a way for it, either by salts which divide the Sulphur, or by Calcination which carries off its grosser part. Notwithstanding it is not to be understood that the *Emetick* faculty of *Antimony* does consist in this salt alone; for if it were alone, it would no more produce this effect than other acid salts do, but it is assisted by the Sulphur, which serves for a Vehicle to exalt it towards the upper Orifice of the stomach. Thus *Antimony* may be said to vomit, by reason of the Saline sulphur it contains.

Crude Antimony is used in Sudorifick decoctions, when we would dissipate a tumor by Transpiration; but great care must be had that no acid may enter into the Decoction, for then it would open its body, and render it *Emetick*. It is dangerous also to take it in substance, because it may be apt to meet with an acid in the stomach that would open its body, and thereby cause a great vomiting to follow.

The reason that *Crude Antimony* causes sweat, is because of some Sulphureous Particles that separate

parate from the *Antimony*, which not being strong enough to make one vomit, do therefore work by transpiration.

Common Regulus of Antimony.

This preparation is an *Antimony* rendred more heavy, and more metallick by the separation that is made of its grosser Sulphurs.

Take sixteen ounces of *Antimony*, twelve ounces of crude Tartar, and six ounces of Salt-peter purified; powder them and mix them well together, then heat a large Crucible red-hot, throw into it a spoonful of your mixture, and cover it with a Tile until the detonation is over, continue to throw into the Crucible spoonfuls of this mixture one after another, until all of it is spent; then light a great fire about it, and when the matter hath been some time in *Fusion*, pour it into a Mortar, or an Iron mould greased with suet and heated, then strike the sides of the said mould or mortar with tongs to make the *Regulus* precipitate to the bottom; when it is cold, separate it from the dross that remains on the top of it with a hammer, and after you have powdered it, melt it in another Crucible, then throw into it a little Salt-peter, there will rise some little flame from it, then pour out the matter into the iron mortar well cleansed and greased, let it cool, and you have four ounces and a half of *Regulus*.

If you melt it over again, and form it into balls of the bigness of a Pill, you have a *perpetual Pill*, that is to say, such as being taken and voided fifty times

times will purge every time, and yet there's hardly any sensible diminution.

This *Regulus* is melted in a Crucible, and then cast into moulds to make Cups and Gobelets. But it is somewhat hard to do it, by reason of a sharpness in the *Regulus* that hinders its parts from uniting so as to spread well. If you put White-wine into these Cups or Gobelets, it becomes Vomitive, like the *Vinum Emeticum* I shall speak of anon.

Remarks.

The name *Regulus* signifies Royal, and is given to the most fixt and hardest matters of many minerals and metals.

This Preparation is made in order to open the *Antimony*, and purifie it from a great deal of gross Sulphur that it is impregnated with, and to this end it is Calcined with Tartar and Salt-peter, which do easily flame, and carry off with them good store of this Sulphur, the rest remains in the *Faces*, as I shall shew in the following Operation.

The mixture is cast into the Crucible by little and little, for fear least if it should be put in all at a time, the detonation growing too violent, and the matter rarefying too much, it might rise over the Crucible.

You must not greafe the Iron Mortar with Oil, by reason of a little humidity that it contains, which would make the matter rise and tumble out. It is greased, to the end that the matter not sticking to the mortar may separate from it the more easily.

The

The *Regulus* is melted again, and Salt-peter thrown into it, to the end, that some little superficial Sulphur, which remained of the dross, may fly away, and the *Regulus* may remain the purer.

Fifteen ounces of dross will be found to four ounces and a half of *Regulus*, and there was used four and thirty ounces of mixture in this operation, so that there loses fourteen ounces and a half during the time it is on the fire.

Although good store of the *Antimonial* Sulphurs do exhale, the *Regulus* is notwithstanding still loaded with them, and it is they which chiefly give it its Vomitive virtue; for the Vomiting doth proceed from a very quick motion that these Sulphurs do give to the stomach, by pricking its Fibres with some salts that they carry along with them.

If you mix this Emetick with an Infusion of *Sen-na*, or some such purgative, it works as much by stool as by vomit, because these Remedies do precipitate with them some part of the Sulphurs.

When a man swallows the *Perpetual Pill*, it passes by its own weight, and purges downwards: it is washt and given again as before, and so on perpetually.

Almost all Chymists have written that this Pill loses nothing at all of its weight, though taken several times. 'Tis true indeed the diminution is but very small, yet nevertheless it would not be hard to remark it in some measure. It may be said also that in place of the Sulphureous parts which do exhale to cause the vomiting, some extraneous bodies do succeed in their place, as it happens when *Antimony* is Calcined in the Sun.

When

When this Pill hath been taken and voided twenty or thirty times, it purges not so much as it did at first, as well because the more soluble parts of the Sulphur are gone, as that what remains doth pass without any great effect. The same doth happen to Cups or Gobelets, which can't make the wine so Emetick as before, after they have been filled twenty or thirty times.

Some do prescribe the *Perpetual Pill*, in the disease called *Miserere*, but this practice is not without danger, because the ball stopping sometime in the Intestines, which are knotted or twisted together in this disease, may cause an Inflammation, and so exulcerate the part. It is given in the Colick, and then it does well.

Wine draws out the Emetick virtue of the *Regulus* much better than water or spirit of Wine, or vinegar can do; the reason of which is, that this virtue does consist in a saline sulphur which water could not penetrate; spirit of Wine indeed does dissolve some of the more sulphureous part of it, but does not take enough of the salt; the vinegar by its acidity does fix too much what it has dissolved; but Wine contains a sulphureous spirit, and a saline Tartar, which do make a most convenient *Menstruum* to dissolve and to preserve the saline and sulphureous part of the prepared *Antimony*.

Upon considering the different ways of evacuation caused by *Antimony*, and many other Medicines, I do find it very probable, that Emeticks do work as they do, because their operation being quick is exerted in the stomach, before the medicin had time to descend more downwards,
and

and then this *viscus* is very sensible when irritated, and undergoes commotions sufficiently violent to make rise what is within it. But if the medicin proves slow in its operation, and descends into the gutts before it raises a purgative fermentation, it then forces downwards, whence it comes to pass that those who do not vomit upon taking emeticks, are commonly purged by stool.

Thus Vomits and Purges do differ only in this, that the first do work in the stomach, the others in the gutts.

Oil, and lukewarm water do vomit, by relaxing the fibres of the stomach, and changing the motion of the spirits which do then act only by shaking, or turning the stomach to a discharge upwards.

If by way of curiosity you would Calcine four ounces of the *Regulus* of *Antimony* powdered, in an earthen cup unglazed, set in a small fire, stirring it all the while with a *Spatule*, there will rise up a vapour for an hour and a halves time, or thereabouts, and when the matter fumes no longer, it turns into a grey powder, that weighs two drachms and a half more than the *Regulus* did at first.

This augmentation of quantity is the stranger, for that the fume which ascended from it during the Calcination, should seem rather to have diminished its weight. It must be therefore granted, that a great many fiery particles have entred into it, in the room of that which fum'd away.

This Fume proceeds from some grosser Sulphur, that remained in the *Regulus*, and indeed it smells strong of the sulphur.

Golden

Golden Sulphur of Antimony.

This preparation is the sulphureous part of *Antimony* dissolved by Alkali salts, and precipitated by an acid.

Take the dross of the *Regulus* of *Antimony*, powder and boil them with common water in an earthen pot half an hour; strain the liquor, and pour vinegar into the expression, there will precipitate a red powder; filtrate and separate your precipitate, dry it and keep it, you will obtain twelve ounces, and two drachms of it, it is called the Golden Sulphur of *Antimony*, and is an *Emetick*: the dose is from two grains unto six in broth or in Pills.

Remarks.

You must put about sixteen pints of water to boil with the fifteen ounces of the dross of *Regulus* of *Antimony*, though the liquor does coagulate like a Jelly when it is cold, by reason of the salts and sulphurs joyning together; for the dross of the *Regulus* is nothing but a mixture of the fixt parts of Salt-peter, and Tartar, that have retained with them some of the more impure Sulphur of *Antimony*.

Now seeing that these salts do become Alkali by means of Calcination, the acid which is poured upon them, does break or destroy their strength, and makes them quit the sulphur which they held

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dissolved,

dissolved, from whence the precipitation of the *Golden Sulphur of Antimony* does proceed.

So soon, as vinegar is poured on the dissolution of the dross, volatile sulphurs do arise which are very disagreeable to the smell; the precipitate which is afterwards made, is like to a *Coagulum* or curd, in great quantity.

This Sulphur does operate much like to the *Crocus metallorum*, of which I shall soon speak. The Chymists have called it *Golden Sulphur*, by reason of its colour, which is near like unto that of Gold; but it is probable that the Antients did understand by the *Golden Sulphur of Antimony*, some other sulphur than this, because almost all of them have writ, that there was a gross superficial sulphur in Antimony, like unto common sulphur, which is this of which our present preparation is made, and another more fixt, and like unto that of Gold, which they held to be Sudorifick.

You must not imagine that our Golden Vomitive Sulphur is altogether Pure, it is still loaded with a great deal of earth and salt, which it has still retained in the precipitation, and it is this salt, which by rarefying its parts, does give it this colour.

Regulus of Antimony with Mars.

This preparation is a mixture of the more fixed parts of Antimony, and some portion of Iron.

Put eight ounces of Small Nails into a great Crucible, cover it, and set it on a grate in a Furnace; surround it above and below with a good fire, and when

when the Nails are red hot, throw into them a pound of Antimony in powder; cover again the Crucible, and continue a great fire; when the Antimony shall be in perfect Fusion, cast into it by little and little three ounces of Salt-peter, a detonation will happen, and the nails will melt; and when there do rise no more sparkles, pour out your matter into a Cornet of Iron mortar, that you shall have greas'd with a little Suet, and heated before-hand: then strike the sides of the mortar with pincers, to make the *Regulus* fall to the bottom; when it is cold, separate it from the dross with a hammer: melt it in another Crucible, and cast into it two ounces of Antimony in powder; when it is melted, add to it by little and little three ounces of Salt-peter, which being burnt, and the matter casting forth no more sparkles, pour it into the Iron Cornet greased and heated as before, then strike it with pincers, that the *Regulus* may fall down, and when it is cool, separate it from the dross as I have said; repeat melting the *Regulus* twice more, and each time cast Salt-peter into it, but the last especially; you must observe to melt it well, before you cast the Salt-peter into it, that the *Star* may appear. There is no need of adding any more crude Antimony to the two last Fusions. This *Regulus* is used as the other, and hath the same effects.

Remarks.

The Iron in the first Fusion mixing with the Antimony turns almost all of it into dross, because

it joyns with the more impure Sulphur, so that the Reguline part being more weighty falls down to the bottom. Salt-peter is used in order to open the Antimony, and cause a more perfect Fusion, that a separation of the grosser parts may be made the better. Moreover it carries off some Sulphurs by its volatile parts. The dross then does consist of Iron, Sulphur, and fixt Salt-peter.

The Fusion is repeated three times over, because some portion of Iron doth always precipitate with the *Regulus*; and a little crude Antimony is added to the first of all, to the end the *Mars*, which easily joyns with Antimony by reason of a gross Sulphur it contains, may leave the *Regulus* and stick to it. The two last Fusions do make a gray or white dross, and this is a mark, that the Salt-peter can receive no more.

After the first Purification, ten ounces of *Regulus*, and thirteen ounces of *Scories* do remain; after the second *Purification*, nine ounces and a half of *Regulus* do remain; after the third, eight ounces and two drachms of *Regulus*; and after the fourth you'l have seven ounces, and six drachms.

The Star which appears upon the *Martial Regulus of Antimony* when it is well Purified, has given occasion to the Chymists to reason upon the matter; and the greatest part of these men being strongly perswaded of the *Planetary Influences*, and a supposed correspondence between each of the Planets, and the M^{étal} that bears its name, they have not wanted to assert, that this same *Star* proceeded from the impression which certain little bodies flowing from the Planet *Mars* do bestow

bestow upon *Antimony* for sake of the remaining Iron that was mixed with it; and for this reason, they wonderfully recommend the making this preparation upon *Tuesday* rather than another day, between 7 and 8 a clock in the morning, or else between 2 and 3 in the afternoon, provided the weather be clear and fair, thinking that day which is denominated from *Mars* to be the time that it lets fall its *Influences* most plentiful of any. They have likewise conceited a thousand things of the like nature, which it would be too much trouble to relate here.

But all opinions of this kind have no manner of probability, for no bodies Experience did ever evince, that the Metals have any such correspondence with the Planets, as I have maintained elsewhere; much less can they prove that the *Influences* of the Planets do imprint such and such *Figures* to Metals, as these men do determine. It would be no hard matter for me here to shew how little reason or foundation there is in discourses of that nature, and how very weak and uncertain are the Principles of *Judicial Astrology*; but this would be too long a Digression for this place, and serve only to swell this Book with things that may be found treated of at large elsewhere, and particularly in the *Epitome* of *Gassendus* made by Monsieur *Bernier*.

My thoughts therefore shall not soar so high as these mens do; and though I may seem dull and mean in their eyes, I shall not search in the *Cælestial Bodies* for an explication of the *Star* we now contend about; seeing I can find it out in causes near at hand. There have been who gazing too

earnestly upon the Stars above, have not perceived the stone at their feet, that caused them to stumble.

I say then that the Star which appears upon the *Martial Regulus of Antimony*, does proceed from the *Antimony* it self; for this Mineral runs all into Needles; but because before it is Purified, it is loaded with sulphureous and impure parts, which do make it softish, these Needles do not appear but confusedly. Now when it is purified with *Mars*, not only a great many of the more sulphureous parts of *Antimony*, and such as are fittest to hinder its Crystallization, are carried away, but also there remains the hardest and the most compact part of Iron, which makes the *Antimony* firmer than it was. So that the Purification does serve to lay open the natural Crystals of *Antimony* in form of a *star*, and the Iron by its hardness does expatiate these Crystals, from whence it comes that the *Martial Regulus of Antimony* is harder than the other *Regulus*.

The Crystals then do appear in form of a *star* in the *Martial Regulus of Antimony*, because they were so naturally in the *Antimony* before. This *star* does not appear exactly the same in the common *Regulus of Antimony*, let it be Purified never so much, because its parts have not the same tension as those of the other.

Glass of Antimony.

This preparation is a *Regulus of Antimony* become vitrified by a long fusion.

Calcine

Calcine in a small fire a pound of *Antimony* in powder, in an earthen pot unglazed, stir the matter continually with an Iron Spatule, until vapours arise no longer; but if notwithstanding your stirring, the powder should change to run into lumps, as it often happens to do, put it into a mortar and powder it; then Calcine it again, as I have said, and when it will fume no more, and is of a gray colour, put it into a good Crucible, cover it with a tyle, and set it in a wind-furnace, in which you shall make a very violent coal-fire round about the Crucible, to the end the matter may melt. About an hour afterwards uncover the Crucible, and putting the end of an Iron rod into it, see whether the matter that sticks to it is become Diaphanous; and if it be, pour it upon a Marble well warmed, it will congeal, and you'll have the *Glass of Antimony*, which you must let cool, and so keep for use. It is a strong Vomitive, and one of the most violent that is made of *Antimony*. The *Emetick Wine* is made of it, by setting it to steep in White-wine. It is given also in substance from two grains unto six.

An *Emetick Syrup* is prepared with the *Glass of Antimony* infused in the juice of Quinces, or Lemmons, and Sugar. If instead of these acid juices, one should use Wine, the Syrup would be the more Vomitive. The dose of the one and the other Syrup, is from two drachms to an ounce and a half, and is given especially to nice persons, and to Infants.

Remarks.

The *Antimony* must be Calcined within the Chimny, and the vapours that fly from it must be avoided as being very injurious to the Breast.

This Calcination is performed to devest it of some gross Sulphurs that might hinder its Vitrification. Some do add to this gray powder *Borax*, others crude Antimony, and others Sulphur, that it may Vitrifie the more easily.

The Vitrification happens not, until the parts of *Antimony* have been rendred more firm and stiff than they were before, to the end the fiery particles passing and repassing through the matter may form the pores into a strait line, so that they can remain in this condition, when the *Antimony* is grown cold; and it is the figure of these pores, which causes the transparency, because they suffer the light to pass through them directly.

The sulphur and antimony do help it to melt, wherefore some do add them to the matter, though in a small quantity, and their volatile part flies away before the Vitrification.

The *Borax* does not only help the fusion, but likewise serves to harden the matter when cold, that the pores may the longer be preserved strait; for, although a great part of the sulphurs of Antimony flies away, yet there remains enough still in the very substance of the glass, which yet do not very long continue in their first position, but shutting the pores of the matter do render it opake.

This

This accident does not happen to such glasses as contain no Sulphur, because their parts being always preserved stiff and firm, their pores do never become obstructed.

Glass of Antimony receiving more Calcination than the other preparations, should consequently be less Vomitive, by reason of the dispersion and loss of much Sulphur, wherein its Vomitive virtue doth consist: Nevertheless experience shews us the contrary, for it works with more force, as I have said; and the reason of it is, because no Salt is used in the making of this glass, whereas in the other preparations Salt-peter is used, which by its fixt parts hinders the activity of some part of the Sulphurs; thus although there doth remain but a small quantity of Sulphur in the *Glass of Antimony*, yet as little as there is being in great motion, it causes a greater disposition to Vomit.

The *Glass of Antimony* may be corrected by Calcining it in a crucible with a third part of Salt-peter, then washing it divers times with hot water, it is to be dried. This powder is not so strong in its operation as the *Glass of Antimony*, because the Salt-peter has fixed some part of the Sulphurs of *Antimony*. It works much like the *Crocus metallorum*, of which I am to treat.

Liver of Antimony, or Crocus Metallorum.

This preparation is an *Antimony* opened by Salt-peter, and by fire, which have made it half glass, and which have given it a Liver-colour.

Take

Take a pound of *Antimony*, and so much *Salt-peter*, powder them, and mix them well together, put this mixture into an Iron mortar, and cover it with a tyle; leave an open place nevertheless through which you may convey a coal of fire, and take it out again, the matter will flame, and cause a great detonation, which being over, and the mortar grown cold, strike against the bottom that the matter may fall down; then separate the dross with a hammer, from the shining part, which is called *Liver of Antimony* from its colour.

To make the *Emerick* wine you must infuse an ounce of this *Liver of Antimony* in powder in a quart of White-wine four and twenty hours, and so let it settle; the Dose of this wine is from half an ounce to three ounces.

That which is called *Crotus Metallorum* is nothing but the *Liver of Antimony* washed several times with warm water, and afterwards dried. It is used as the *Liver of Antimony* to make the *Emerick* wine, and it is given likewise in substance to Vomit strongly: the dose is from two to eight grains.

Remarks.

This preparation is a more impure *Glass of Antimony* than that I described, and consequently it is more opaque; it works not so violently as the glass.

The *Liver of Antimony* hath a different strength according to the proportion of *Niter* that enters into it; when there's more *Niter* than *Antimony*, it is the less Vomitive, not only because great store
of

of the Sulphurs of Antimony are lost in the strong detonation that it raises, but also because there remains more fixt parts of the Salt-peter, which do joyn and unite with the Sulphurs that remain in the matter. Thus if instead of a pound of Salt-peter you should use twenty ounces, as many do, you'd have a *Liver of Antimony* less Vomitive than that I described. Now on the contrary when less Salt-peter than Antimony is used, the *Liver* that proceeds from this mixture is not so Vomitive as that I now described; the reason of it is that the Sulphurs of Antimony have not been sufficiently stirred by the Salt-peter in so little a quantity: for Antimony becomes not Vomitive, but only when it hath been sufficiently opened, either by fire, or some Salts. The most convenient proportion then that can be observed to render the *Liver of Antimony* as Vomitive as may be, is to take equal parts according to my description.

The strong detonation that happens when fire is put to the matter, is not caused through the flagration of Salt-peter, as almost every body hath thought, through want of sufficient reflexion; I shall prove in its proper place that it can never take flame, and that its volatile parts do serve for a kind of Bellows, or Vehicle to rarifie and exalt the Sulphurs of Antimony.

A *Liver of Antimony* is prepared with equal quantities of Antimony, Niter, and Sea-salt decrepitated; and because these salts do give it a red colour like unto the *Opale*, this preparation has been called *Magnesia Opalina*; it is less Emetick than the other, by reason of the addition of sea-salt, which fixes the saline Sulphur of Antimony.

Several

Several other ways of preparing the *Liver of Antimony* have been invented ; but I am contented with having given you the best of all, and the easiest to prepare.

If you use ordinary salt-peter in this Operation, you'l obtain eight ounces and two drachms of *Liver of Antimony* ; but if you use purified salt-peter, you'l get but six ounces and a half.

This difference of quantity proceeds from the nature of salt-peter, for the more volatile parts this Mineral salt contains, the more apt it is to carry off some parts of the Antimony. Now purified Salt-peter is much more volatile than the common sort, wherefore the *Liver of Antimony*, where it is used, is in lesser quantity.

The *Liver of Antimony* that's made with common salt-peter is the redder, and comes nearer to the colour of an Animals Liver, than that which is made with purified salt-peter ; this happens through the fixt salt which is in this preparation more than in the other ; for common salt-peter contains much fixt salt, as I shall shew in its proper place ; this salt does likewise make the matter the heavier.

As for the virtues of these *Livers of Antimony*, the difference is not very great, but only that which is made with purified salt-peter is a little more Emetick than the other.

I cannot pass by here the false imagination of some men who think that preparation of the *Liver of Antimony*, of which half a drachm, or two scruples may be given, is much better than that whereof 3 or 4 grains perform the same effect ; for there is no doubt but the taking so great a quantity of Antimony will give an impressi-

on to the stomach, that a lesser quantity is not able to do. Furthermore, whereas these kind of preparations do commonly open the Antimony but little, or but half-fix the saline sulphurs, it is to be feared lest some salt they may meet with in the stomach, should open them too much, or volatilize them, and so cause most unhappy accidents.

When the *Liver of Antimony* is washed with warm water, some part of the fixt *Niter* that remained in it is separated. Many have believed that the more violent part of the Emetick was carried off by this Lotion: but on the contrary, this fixt part is more capable of mitigating than augmenting its violence for the reasons I have spoke already.

You must observe that if you should put four ounces of prepared Antimony into a quart of wine, the wine will not be more Vomitive than if you should put but an ounce; because being loaded with as much of the substance of it as it is able to contain, the rest remains at bottom, and cannot be dissolved unless more wine be added. Now an ounce of *Crocus Metallorum*, or *Liver of Antimony* is, according to experience, capable of impregnating not only one quart of wine, but after having poured off the liquor by Inclination, if you put as much more wine to the matter that remains, and leave it in digestion two or three days together, you'll have an Infusion as Emetick as the first. You may if you please renew the wine that is poured upon it to be infused, nine several times, and it will always prove Emetick; after which, if you Calcine your matter a quarter of an hour in an earthen pot unglazed over a small fire,

fire, stirring the matter continually with an Iron Spatule, you may infuse it again as before, and it will render the wine Emetick.

That Emetick wine which is made with the *Crocus Metallorum* is most in use; it is likewise prepared with the *Regulus* and glass, as I have said speaking of them.

You might likewise make another sort of it, by infusing warm some days crude Antimony in white-wine; for the tartarous salts of the wine do open the Antimony, but it would not prove so vomitive as the other.

The Emetick wine is given alone, or mixed with Purgatives, that convey it partly by stool. When you find an Inclination to vomit, you must be provided of broth a little fat, and take some spoonfuls to facilitate the Vomiting, and hinder the great efforts which sometimes break vessels, and cause mortal Hemorrhagies to follow. You must also consider that those who have their breasts strait, and bodies thin, are much harder to vomit than others. But let us leave those particulars to the wisdom of Physicians.

Antimonium Diaphoreticum.

This preparation is an Antimony, whose sulphurs are fixed by Salt-peter, and are thereby hindered from working otherwise than by sweat.

Powder and mix well together one part of Antimony with three parts of purified Salt-peter; and having heated a Crucible red-hot in the Coals, cast into it a spoonful of your mixture, you'll hear

a noise or detonation; after that's over, cast in another spoonful, and continue to do so 'till all your powder is in the Crucible. Leave a great fire about it two hours, then throw your matter which will be white, into an earthen pan almost filled with Fountain-water, and leave it a steeping warm ten or twelve hours, that the fixt Salt-peter may dissolve in it; separate the liquor by Inclination, wash the white powder that remains at bottom five or six times with warm water, and dry it. This is called *Antimonium Diaphoreticum*, or mineral Diaphoretick, or the *Calk* of *Antimony*.

This Preparation is esteemed good to procure Sweat, and to resist Poison, and consequently is good in Malignant Feavers, the small Pox, the Plague and other Contagious diseases. The dose is from six grains to thirty, in some appropriate liquor.

All the Lotions may be evaporated, and a fixt Salt-peter will be found at the bottom of the vessel, which works much like the *Sal Polychrestum*.

Remarks.

In this preparation three pounds of Salt-peter are used; for one pound of Antimony, that after sublimation of the volatile parts there may remain store of fixt Niter, which unites with the Antimony, and hinders it from being Vomitive.

It is observable, that three parts of Niter with one of Antimony do not cause so strong a detonation, nor so great a diminution of the parts of Antimony, as when there are but equal quantities.

And

And the reason of it is, that there's too little sulphur of Antimony for the quantity of Niter, and that some part of the sulphur does remain unactive in the fixt Niter, which admits not of flagration, for the volatile part of Salt-peter does not burn, but according to the proportion of sulphur with which it is mixed. And this is a proof of my assertion in this matter, that if you throw upon lighted coals, a little of that Salt-peter which you shall have drawn from the lotions of *Antimonium Diaphoreticum*, it will still cause a flame to arise, by reason of new sulphur which it meets with in the coals, which sulphur does joyn together with the volatile part of Salt-peter that remained. I shall speak more at large of the flagration of Salt-peter, in the Chapter of this Salt.

You must put the mixture into the Crucible spoonful after spoonful, that the Calcination may be done the better. When it is ended, the matter is washed, for to separate the Salt-peter that is unuseful. But let there be never so many lotions, they can never wash away a certain enveloping or cover that is given to the Antimony by the fixt Salt-peter; for each particle of Antimony is so closely united, that it cannot any way be separated without recourse to some reductive Salt; and this is it that makes this preparation of Antimony to be not at all Vomitive. Many do say it is Sudorifick, but I could never observe any such effect sensibly. Nevertheless I would submit to think so, both because many Authors have written so, and because the heat of the body may possibly separate some of its Sulphurs, which not being strong enough to make one Vomit, may only drive

drive by Transpiration sensible or insensible; according as the pores are more or less open. Others do think *Antimonium Diaphoreticum* is meerly an alkali; that is good for nothing but to destroy acids, and on this principle do give it for the same ends as Coral, Perle, Calcined Harts-horn, and such like things as do absorb-sharp or acid humours, which abounding too much in the body do cause divers diseases; but without doubt they that follow these principles have not built them on Experience; for pour any kind of acid on *Antimonium Diaphoreticum*, it will never dissolve at all, and take away the acid after a very long Infusion; it will be as strong as ever; which proves it to be no alkali, and therefore not to produce the effects that are pretended.

The *Cornachine Powder* is made of equal parts of *Antimonium Diaphoreticum*, Diagryde, and Cream of Tartar. The dose is from 20 to 45 grains.

Another Antimonium Diaphoreticum.

This preparation is a Calcination of Antimony, by which it is fixed, and rendred sudorifick, without losing the volatile part which sublimes from it.

Take a good earthen pot unglazed, able to resist the fire, with a hole in the middle of its height, and a stopple to it; set it in a Furnace of an equal proportion, and fit to it three pots more of the same earth, all three open at the bottom, and fit a glass head to the uppermost pot, with a little Viol for a Receiver. Lute the junctures well, and by

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the means of some Bricks and Lute together, let the fire transpire only through some little holes, and be but strong enough to warm the bottom of the lowermost pot; then give your fire by degrees, to heat this pot by little and little red-hot.

In the mean time mix three parts of Salt-peter, with one of *Antimony* in powder; cast a spoonful of it into the red-hot pot through the hole, and stop it again quickly, you'll perceive a great detonation, and after it is over, cast in another spoonful, and continue to do so until all your matter is spent. Then encrease the fire to the utmost for half an hours time, and so let it go out. Unlute the vessels as soon as they are cold, you'll find a little Spirit of Niter in the Receiver; white flowers in the three upper pots, and a white mass in the lowermost, which may be washed as the other *Antimonium Diaphoreticum*, and so dried. This Mineral Diaphoretick is as good as the former; you must wash the flowers several times with warm water, and then dry them. They are not so Emetick as those I shall describe hereafter; the dose is from two to six grains.

Remarks.

In this preparation the volatile or Sulphureous parts of *Antimony* do stick to the sides of the pots like flower; if you don't wash them, they will not be so Vomitive, because the Salt-peter that rises with them, hinders their activity.

The acid spirit which is found in the Recipient may be used in the Colick; the dose is from
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four to eight drops in Broth, or some appropriate liquor.

If you use in this operation five ounces of Antimony, and fifteen ounces of Salt-peter, you will draw half an ounce of Spirit of Niter, two drachms of flowers of Antimony washt, and dried, and five ounces of very white *Antimonium diaphoreticum*, after that it is well washt and dried; and if you evaporate and crystallize the lotions, you will find ten ounces of Salt, which will be a Salt-peter half fixed, and which will flame being thrown upon the coals; insomuch that there will be lost in the whole of the mixture, four ounces and two drachms. This diminution comes from what loses through the hole of the pot, during the detonation, for stop it as well as you can, there will always vent out a great deal of fume, which will incommode the Artist, unless he takes care to turn away his head from the steam.

The purified Salt-peter loses no more than the other, because the sulphur of Antimony can take of the volatile parts of Salt-peter but such a proportion as it requires to raise it. So that in fifteen ounces of Salt-peter, (whether it be the purified sort or the common) there are much more volatile parts than are necessary, in order to joyn with the sulphur of five ounces of Antimony.

Although there do rise a great many parts of Antimony with the volatile portion of Salt-peter in the detonation, yet we find that the *Antimonium diaphoreticum* which remains, does weigh as much as the Antimony which was employed in the operation; the reason of which is that in place of the part of Antimony that exhales, a great deal

of Salt-peter does as it were inseparably join with the remainder, and this is that which fixes it, and hinders it from being vomitive, as I have said.

Again, although Antimony is naturally black, it becomes altogether white, when it has been well rarefied; for all that we see in this operation, is a pure white, as well the volatile as the fixt, which shews very well that colours have no real being.

An *Antimonium diaphoreticum* may be prepared, and at the same time likewise a sulphur of Antimony, after the following manner.

Dissolve within the chimney, what quantity you please of crude Antimony with three times as much *Aqua Regalis*, in a glass body, there will appear a strong ebullition with red vapours, which must be avoided as being very injurious to the breast; when the dissolution is over, pour upon it a great quantity of water, in order to weaken the *Aqua Regalis*, upon which the whole turns into a milk, and then a Precipitate in a white powder falls to the bottom of the vessel.

You will likewise see a kind of gray scum swim upon the liquor, which you must gather up with a Spatule, or with a wooden spoon, and dry it in the shade; it is a sulphur which fires like common sulphur, and is good for nothing else.

You must decant the water from the body, and washing the precipitated powder divers times, and drying it, you will have an *Antimonium diaphoreticum* that may be used as the former; this preparation indeed is not much in use, but many do prefer it before all the others.

When Antimony is Calcined by the heat of the Sun, as through a Burning-Glass; instead of losing its

its weight, as one would think it should by reason of the evaporation of Sulphureous parts, it does increase in weight: which shews that some more ponderous bodies have succeeded in the place of those that are gone.

Flowers of Antimony.

This preparation is the more volatile part of Antimony raised by fire.

Fit the same pots I spoke of in the last Operation, one upon another; set them in the same Furnace, and observe the same circumstances for their situation, and for heating the lowermost. When its bottom is red-hot, cast into it a small spoonful of Antimony in powder through the hole, and stir the matter at the bottom of the pot with an Iron Spatule crooked a little on purpose to do it the better; draw out your Spatule, and stop the hole, the flowers will rise and stick in the upper pots. Continue a great fire, that the pot may still remain red-hot, and when you see nothing more sublime, cast in so much more Antimony, observing to do what I have said. Repeat the casting it in through the hole, till you have flowers enough. Then let the fire go out, and when the vessels are cold, unlute them, you'll find flowers all about the three upper pots, and the head, gather them together with a Feather, and keep them in a Viol.

It is a powerful Emetick; it is given in Quartan Agues, and other Intermittent Feavers, and also in the Epilepsie; the dose is from two grains to six in Lozenges, or Broth.

Remarks.

In this preparation, as in the former, you must leave room enough; otherwise the flowers of Antimony being driven fiercely by the fire, would be apt to break the vessel for want of room to move in. And this is the reason why many pots are here placed one upon another. There's no need of any Receiver, because there is no liquor to fall into it; so that a blind head may serve.

At the bottom of the pot which contained the matter, there remains a mass of the more terrestrial part of Antimony, that must be flung away as being good for nothing.

If the *Flowers of Antimony* do happen to be of different colours, it is because the fire was not managed equally strong; these *Flowers* are more Vomitive than the former, because they have no Salt-peter in them.

Red Flowers of Antimony.

These *Flowers* are the more sulphureous part of Antimony rarefied and exalted by fire.

Powder and mix well together four pounds of common glass with one pound of Antimony, put this mixture into an earthen, or glass Retort luted, whose half is empty; set it in a Reverberatory Furnace, and fit to it a large Receiver, lute the junctures lightly, and give a little fire at first to warm the Retort, then augment it by degrees,

grees, and you'll see *Red flowers* come forth into the Receiver : continue the fire until no more can come, which you'll know as you unlute the junctures ; and taking off the Receiver gather your *Flowers*, and keep them for use. They are more Vomitive than the former, and are given to the same intents : the dose is from two grains to four in a Lozenge, or some appropriate liquor.

Remarks.

That which makes these *Flowers* more Vomitive than the former, is the more terrestrious or fixt part of *Antimony's* being kept from rising by the glass, so that what is exalted by the fire is more Sulphureous, and consequently more Emetick.

The red colour of these *Flowers* doth proceed from the abundance of Sulphur they are impregnated with, and it may be said that glass, which is an alkali, acting on this Sulphur gives it this colour after the same manner as Quick-lime, or the alkali Salt of Tartar makes common Sulphur turn red, when they are boiled together in water.

The time that you take these *Flowers* of *Antimony*, you must often drink broth, both to facilitate the vomiting, and dull the great activity of this Remedy ; for it is one of the strongest vomits that is in Physick. But because it sometimes happens that this Powder sticking in the membranes of the stomach, or some of its folds, doth cause a continual vomiting, notwithstanding the frequent use of broths, you must then add the Cream of *Tartar*, and dissolve it in the broth, and so take some

spoonful every quarter of an hour. This Cream of Tartar stops the vomiting, because it joyns with the Sulphurs of *Antimony*, and fixes them, so that they precipitate by stool.

Butter, or Icy Oil of Antimony.

This preparation is an *Antimony* rendred caustick by acids.

Powder, and mix six ounces of the *Regulus* of *Antimony*, with a pound of Sublimate Corrosive; put this mixture into a glass Retort, whose half remains empty; set your Retort in Sand, and after having fitted to it a Receiver, and luted the conjunctions, you must first make a small fire under it, and there will distil a clear oil; after that, augment the fire a little, and there will come forth a white thick liquor like *Butter*, which would stop the neck of the Retort, and break it, if you did not take care to set live Coals near it, that it may melt and run into the Receiver. Continue the fire, until you see a red vapour come forth. Then take away the Receiver, and put another in its place filled with water. Encrease the fire by degrees, to make the Retort red-hot, and the *Mercury* will run into the water, dry it, and keep it for use as other *Mercury*.

The *Butter* of *Antimony* is a Caustick, it eats proud flesh, and cleanses Ulcers; the Powder of *Algarot* is made of it, as I shall shew hereafter.

Remarks.

Remarks

This *Butter of Antimony* is nothing but a mixture of the acid Spirits of Sublimate Corrosive with the *Regulus of Antimony*, and those Spirits are they that render it Caustick.

The spirits of Salt and Vitriol in this operation do leave the *Mercury* to adhere unto the *Antimony* which is more porous; insomuch that the *Mercury* being divested of that which kept it in a Crystalline form, and being driven by a strong fire, rarefies into vapours, which pass through the neck of the Retort into the Receiver filled with water, wherein it condenses into Quick-silver by means of the coolness.

I doubt not but some will find difficulty in conceiving how the acids that adhered to the solid body of *Mercury* should strike off to joyn with the *Antimony*; but it may be said to that, that the acids being so many edges fastned at one end in the body of *Mercury*, may by t^other end be separated and drawn off by the soft and ramous parts of the *Antimony*, that are in greater motion than the *Mercury*.

Instead of *Regulus*, the Liver, or Glasse of *Antimony* might serve if you please.

Butter of Antimony, together with its Cinnabar.

The first of these preparations is an *Antimony* opened, and rendred caustick, by the acids of Sublimate

limate Corrosive; and the second is a mixture of the *Mercury* that was in the sublimate, and of the Sulphurs of *Antimony* sublimed together.

Fill a Retort half full with Sublimate Corrosive, and *Antimony* powdered and mixed well together. Set your Retort in Sand in a small Furnace, and fitting a Receiver to it, and luting the junctures, proceed in the distillation the way I shewed in the preceding operation with *Regulus*, observing the same circumstances.

When the red vapours begin to appear, take away the Receiver, and put another in its place without luting the junctures; encrease the fire by little and little till you make the Retort red-hot: continue it so three or four hours, then let the Retort cool, and break it, you'll find a *Cinnabar* sublimed, and adhering to the neck, separate it and keep it: it is a good Remedy for the Pox, and the Epilepsie, it purges by sweat, the dose is from six to fifteen grains in Pills, or *Bolus*, with some proper Conserve.

This Butter of *Antimony* is Caustick like the other I now spoke of. It may be rectified by distilling it anew in a glass Retort.

Remarks.

In the Receiver are found little crystals sticking to its sides, which do curiously represent the branches of trees; these figures do proceed from the acid spirits of sublimate mixed with *Antimony*.

If you have used five ounces of Sublimate Corrosive, and the same of *Antimony*, you'll draw two ounces

ounces and a half of very good *Butter of Antimony*, three ounces and six drachms of *Cinnabar of Antimony*, and half an ounce of *Quick-silver*.

The mass which remains in the Retort, does weigh two ounces and a half.

Thus the matter has lost six drachms, which loss happened, whilst the *Cinnabar* was rising.

The *Quick-silver* is found in the neck of the retort with the *Cinnabar*, and in the last receiver.

Sometimes a kind of mossy substance is found at the end of the neck of the retort, which does represent many little figures; it is the more rarefied *Cinnabar*.

The mass which is found at bottom of the retort is the more terrestrious part of the *Antimony*, and is to be slung away.

In the preceding operation the *Mercury* did not find sulphurs enough to adhere to, whence it happened that it came forth flowing; but in this operation wherein crude *Antimony* is used, which hath all its sulphur, whilst the Corrosive spirits sticking to the *Antimony* come forth in Butter, the *Mercury* joyns with the sulphur, and by the action of fire sublimes afterwards into *Cinnabar* in the neck of the retort; for to make *Cinnabar*, Sulphur and *Mercury* must be sublimed together. Now if you have the curiosity to anatomise *Cinnabar*, you must powder it, and mix it with a double quantity of Salt of *Tartar*; then putting it into a Retort, distil with a great fire the *Mercury* into a Receiver filled with water, the Sulphur will remain in the Retort with the Salt of *Tartar*, but may be separated from it by boiling it in water. Filter the Decoction, and then pour upon it distilled Vine-

Vinegar; a gray powder will precipitate, which may be washed with water and dried, thus you have the *Sulphur* of *Antimony*, which is much esteemed for diseases of the Breast, six or eight grains of it are given for a dose in some liquor appropriate to the disease.

If you mix Butter of *Antimony* with double its weight of oil or spirit of *Sulphur* prepared according to my description, you will have a liquor that is good for foul bones, and for venereal ulcers and Chancres; it is applied on pledgets, and works much like the oil or liquor of *Mercury* that I have described.

The Emetick powder of Algarot, or, Mercurius vitæ.

It is a Precipitate of *Antimony*, or Butter of *Antimony* washed.

Melt in hot sand the first butter of *Antimony* I described with *Regulus*, and pour it into an earthen pan wherein are two or three quarts of warm water, a white powder will precipitate, that must be sweetned with many lotions, and so kept; it is improperly called *Mercurius vitæ*. It purges upwards and downwards; it is given in Quartans and Intermitting feavours, and all the maladies wherein it is required to purge strongly; the dose is from two grains to eight in Broth, or some other convenient liquor.

If you joyn all the lotions together, and evaporate about two thirds, or until the liquor becomes
very

very acid, you'll have a Philosophick spirit of *Vitriol*, that may be used like common spirit of *Vitriol* in Juleps, to give them an agreeable acidity.

Remarks.

I have said before that the Butter or Icy Oil of *Antimony* was nothing but a mixture of the spirits of Salt and *Vitriol* with the *Regulus* of *Antimony*. This last operation confirms this opinion, because when this Butter is cast into warm water, these spirits render the liquor very acid, letting the *Regulus* of *Antimony* fall down to the bottom, so that the powder of *Algarot* is an *Antimony* transmuted much like the white flowers I spoke of before.

The water does separate or take off very well the acid spirits from the Butter of *Antimony*, because they cannot have a good hold in the pores of this softish and sulphureous mineral, but it was not able to separate those same acids from the Sublimate Corrosive, because the pores of *Mercury* being of a closer fabrick than those of *Antimony*, they do retain what they once receive into them, with greater strength.

The powder of *Algarot* may be made after the same manner as the Butter that may be drawn from crude *Antimony*, or else with the Liver, or Glasse, but that which is made with crude *Antimony* is not so white as the rest.

If you do use four ounces of Butter of *Antimony*, you will draw an ounce and six drachms of *Mercurius vita*, after it is well washed and dried, insomuch that four ounces of this Butter do contain

tain two ounces and two drachms of acid spirit, in which its corrosion does consist.

The acid liquor, called Philosophick spirit of *Vitriol*, does grow in a manner insipid in length of time, because its acidity has been volatilized by the *Mercury*, and afterwards by the *Antimony*.

Bezoar Mineral.

This preparation is an *Antimony* fixed by spirit of *Niter*, and rendred sudorifick.

Melt in hot ashes two ounces of the Butter of *Antimony*, and pour it into a Viol or a Bolthead, drop into it good spirit of *Niter* until the matter is perfectly dissolved, commonly so much spirit of *Niter* is requisite as there is Butter of *Antimony*; during the dissolution there will rise up vapours that you must have a care of, and therefore will do well to place the vessel in the Chimney. Pour your solution into a glass body, or an earthen dish, and evaporate it in a gentle sand-fire until it is dry; there will remain a white mass, which you must let cool, and then pour upon it two ounces of spirit of *Niter*; set the vessel again in sand, and evaporate the liquor as before; once more pour two ounces of spirit of *Niter* on the white mass, and having evaporated the humidity, encrease the fire a little, and Calcine the matter for half an hours time, then take it off the fire, and you have a white powder, which you must keep in a Viol well stoppt. It is sudorifick, and serves for the same uses as *Antimonium Diaphoreticum*: the dose is from six to twenty grains, in broth, or some appropriate liquor.

Remarks.

Remarks.

The Spirits of Vitriol and Salt were not strong enough, nor in quantity enough to make an entire dissolution of the *Antimony*, they only made a light adhesion to it, but when they are joyned with spirit of *Niter*, they act with much more force; for they penetrate and divide every particle, and do render them imperceptible, and incapable of receiving a more exact dissolution. Now in this penetration, as in the solution of *Mercury*, there happens a great effervescency, for which reason I advise to pour the spirit of *Niter* by little and little, for fear the matter should rise above the vessel. This effervescency doth proceed from the resistance, that the edges of the spirits do meet with, when they enter into the pores of the *Antimony*: for so soon as the dissolution is ended, there is no further Ebullition. Afterwards the humidity is evaporated, and new spirit of *Niter* poured twice more on the fixt mass, as I have said; after which the Butter of *Antimony* that was so great a Caustick, and Emetick, becomes one of the mildest medicins we have, and near approaching the preparation of *Antimony* that is called Diaphoretick.

This great change may well make us wonder at it, and it is hard to conceive how an acid Corrosive spirit, such as spirit of *Niter*, should be able to to sweeten a matter that became Caustick only for being impregnated with acid spirits.

To

To give this difficulty some solution, it may be said, that the Butter of *Antimony* became Caustick, for that the acids which it contained did but superficially adhere, and were so adapted that the motion of the *Antimonial* parts did serve them for a vehicle to distribute their keenness as they did; but that after the solution, the acids being in great quantity, do fix the *Antimony*, and not only destroy its aptitude to motion, but do so sheath or lock themselves in the pliant sulphureous parts of this mixt, that they lose thereby all their corrosion.

In the evaporation, abundance of the sulphurs, which were in the Butter of *Antimony*, are lost.

This powder is called *Bezoar Mineral*, because it causes Sweat, like the *Bezoar* stone.

You must know that these preparations are nothing but so many transformations of the *Regulus of Antimony*, made by acid spirits or by fire; so that by Fusion, or by the means of some reductive salt, they may be recovered into *Regulus* again, by destroying those salts which kept them under this form.

Caustick Oil of *Antimony*.

This preparation is a portion of *Antimony* dissolved in the acid spirits of salt and vitriol.

Put into a glass retort six ounces of *Antimony* finely powdered, pour upon it four ounces of good spirit of salt, and the same quantity of the Caustick Oil of *Vitriol*, shake and mingle them all together, and stopping the retort, set it in sand, with

with the nose upwards, give it a small digesting fire for four and twenty hours, then turn the nose downward, and when you have unstopt it, fit to it a glass receiver, lute the junctures with a wet bladder; make a little fire gradually to the second degree, and there will distil a whitish liquor; increase it a little at last, and continue it until nothing more comes forth into the receiver. Let the vessels cool, and unlute them, keep what you find in the receiver well stopt in a bottle.

It is an Escharotick liquor, and will serve to open Venereal Shancres, to eat proud flesh, to cleanse old ulcers, to use in carious bones, and in the gangrene.

Remarks.

The Retort must be big enough for at least half to remain empty, that the vapours may find room enough for their rarefaction.

I put the whole in digestion four and twenty hours, that the acids may have time to open the *Antimony*. If I should add unto this mixture eight or ten ounces of spirit of *Niter*, the *Antimony* would dissolve with a great ebullition, because those three sorts of acid spirits would together make an *Aqua Regalis*, with which *Antimony* is easily dissolved, but there is no need of making so exact a dissolution for this operation.

This liquor is improperly called oil, for it is nothing but a solution of *Antimony* by acid spirits. It differs from the Icy Oil of *Antimony* only in this, that it contains more phlegm, for the acids

R

of

of sublimate corrosive have no aqueous moisture to dilute them, as there is in the acids we do here use.

With this Oil may be made the powder of *Algarot*, after the same manner as with the Butter, but only then it would not be so white. This liquor might be likewise used for the making *Bezoar Mineral*. Spirit of *Niter* being poured upon it, there rises an ebullition, as when it is poured on Butter of *Antimony*.

This Oil of *Antimony* is not so Escharotick as the butter, because it contains more phlegm. It is also more easie to use by reason of its liquidity.

Another Oil of Antimony.

This preparation is a solution of some parts of *Antimony*, by the acid spirit, and oil of Sugar.

Take equal parts of *Antimony* and Sugar Candy, powder them and mix them, put this mixture into a glass retort large enough for the matter to fill but a third part of it; set your retort in sand, and fit a receiver to it, give a gentle fire for the first hours to distil off a phlegmatick water; and when red drops begin to come forth, sling away that which is fall'n into the receiver; then refitting it, lute the conjunctions, and make the fire a little stronger, but manage it prudently; for otherwise the matter will rarefie and run into the receiver in substance, so that you'l be forced to begin the Operation anew; continue the fire until nothing more comes forth; and when the vessels are cold, take and keep what you find in the receiver.

This

This liquor is *Oil of Antimony* It is proper to cleanse Ulcers with, and for Tettars and Itchings which infect the skin. If it proves too sharp, you may temper and qualifie it with the water of honey.

Remarks.

The Sugar contains an essential acid salt, and an oil, which being mixed with a portion of the sulphurs of *Antimony*, do make an oily liquor.

The sweet taste of Sugar does proceed from a natural mixture of this acid with the oil, for if you separate these two substances one from the other, neither of the two will prove at all sweet.

The Oil all alone is insipid upon the tongue, because it makes little or no impression on the nerve that serves for tasting, but when the acid is intirely mixed with it, the edges of this acid do serve for a vehicle to the oil to make it penetrate, and tickle superficially the nerve, whereby the sense of tasting is produced.

The acids therefore being alone, do become incisive, and prick the tongue by their edges, but when they are dulled and blunted by the ramous parts of the Oil, then they have another sort of determination, and can no longer pierce the nerve of tasting but with a great deal of tenderness, and gentleness.

CHAP. X.

Of Arsenick.

Arsenick is a Mineral Body consisting of much Sulphur, and some Caustick salts, There are three sorts of it, the White that keeps the name of *Arsenick*, the Yellow called *Auripigmentum*, or Yellow *Orpin*, and the Red called *Realgal*, or *Sandaracha*; the White is the strongest of all, and is sometimes transparent like crystal. Some do add to these for a fourth kind of *Arsenick*, a Yellow *Arsenick*, which is an *Orpin* differing from the other only in this, that it is not so transparent, nor of so high a colour.

None of these *Arsenicks* may be given inwardly, although several persons that have ventur'd to use the white, do pretend to have cured with it divers diseases, and among others the Quartan-Agüe. They venture to give of it as far as four grains, in a great deal of water, and after that manner it will Vomit, like *Antimony*. But I can by no means allow of this *Febrifuge*, and would never advise any body to use so dangerous a Remedy. Nature doth furnish us with Medicines enough of Conscience to provoke Vomiting without recourse to *Arsenick*. It is used outwardly with sufficient success, because it eats proud flesh.

People sometimes cover the Corns of their feet with *Arsenick* in powder, and it eats them to the

root

root without any pain, but they must be sure to cover the adjacent flesh with a plaister of *Dialma*, after the same manner as when Causticks are applied.

Regulus of Arsenick.

This preparation is the more fixt and compact part of *Arsenick*,

Powder and mix together a pound of *Arsenick* with six ounces of gravelled Ashes, incorporate this powder in a pound of soft soap, and make a paste of it, put it in a great Crucible, and cover it with an earthen cover, that hath a hole in the middle; set your Crucible in a wind-furnace, and give a little fire at first, then augment it gradually, that the matter may be in a clear fusion: throw it into a mortar greas'd at the bottom, or into a *Culot*, strike it round about a little with pincers, and let the matter cool, then knock it out, you'll find in the bottom of the mortar a *Regulus of Arsenick*, separate it from the dross. It is not so Corrosive as *Arsenick* it self, and its effect is milder.

Remarks.

The soap being full of an alkali salt, and the gravelled Ashes do correct or fix the great activity of the sulphurs of *Arsenick*.

A hole is made in the cover that the more volatile part may sublime with the Oil and humidity that are in the Soap, the alkali salts do remain in

the dross with some part of the more gross sulphurs of *Arsenick*.

If by way of Curiosity you should boil the dross in water, Filtrate the decoction, and pour Vinegar upon it, or some other acid, to break the force of the alkali's, a Sulphur of *Arsenick* will precipitate, that is stronger than *Arsenick* it self.

Arsenick being compounded of abundance of sulphurs, is not so quick in its operation as Sublimate Corrosive, because these sulphurs do not know so fast as the acid salts.

If *Arsenick* should happen to be taken inwardly through any mistake, the person may still be saved half an hour afterwards, by swallowing good store of warm oil, to Vomit and Purge; after that he must be purged with *Cassia*, and Salt of *Tartar*, and he must often drink Salt of *Tartar* in Broths, that if any sulphur should chance to remain, it might be fixed by this Salt; for when *Arsenick* is in the body, the heat of the body raises and rarefies the sulphurs on every side.

Sublimate of Arsenick.

This operation is an *Arsenick* corrected from its more malignant sulphurs, and raised by the means of fire to the top of a matrafs.

Put what quantity you please of *Arsenick* grossly powdered into a Crucible, set it in a small fire under the Chimney to Calcine and evaporate about the third part of the matter. Avoid as much as may be this malignant vapour, pour into a mortar that which remains, and when you have powdered it,

it, weigh it, and mix it with an equal quantity of *Salt Decrepitated*: put this mixture into a matrafs, whose two thirds remain empty; set your matrafs in sand in a small Furnace, and making a little fire at first, encrease it by little and little to the third degree, in order to Sublime the *Arsenick*: continue it in this condition until there rises no more, the operation is ended in five or six hours, let the vessel cool, and break it, gather that which sticks to the top of the matrafs, and keep it, fling away that which remains at bottom.

If you should repeat the Sublimation four or five times, adding salt each time, a sweet Sublimate of *Arsenick* would be made, that is to say, abundantly less corrosive than common *Arsenick*.

Some Authors tell us that this sweet *Arsenick* is a Counterpoison, but I shall never think it convenient to trust to such an Antidote, seeing we don't want those that are safer.

The Sublimate of *Arsenick* eats proud flesh, and cleanses old Ulcers, being mixed with the common *Suppurative*, and *Egyptiacum*.

The same Operation may be performed with *Orpin*.

Remarks.

The *Arsenick* is Calcined, to the end the more volatile part may fly away in fumes; if you should continue the fire, and encrease it toward the end, every jot of the *Arsenick* would fly away. Some do sublime it without addition of any thing else, after it is Calcined, but it is bet-

ter joyn some body that may fix it a little, such as Salt.

Seeing the sublimate of *Arsenick* doth resemble sublimate Corrosive in colour, some Cheats do falsifie sublimate Corrosive by mixing with it that of *Arsenick*. I have shewn the way to discover this imposture in the Chapter of sublimate Corrosive.

The Salt Decrepitated does fix the great volatility of *Arsenick*, and the fire carries off some of its more active sulphurs, insomuch that the oftner it is sublimed, the more it does dulcify, and becomes proper to apply to flesh, where we would gently corrode.

If you sublime *Arsenick* alone in a bolthead, with a great fire, without having Calcined it at all before, the sublimate will be converted into a glass, much resembling common glass both in colour and transparency.

Caustick Arsenick.

This operation is an *Arsenick* rendred more fixt, and more burning than it was before, and in form of a *Calx*, by the means of fixt salts.

Powder and mix together a pound of *Arsenick*, so much *Salt-peter*, and half a pound of *Sulphur*; put this mixture into an Iron mortar, cover it with a Cover that hath a hole in't; thrust a red-hot Iron, or a lighted coal, through the hole, the powder will take fire with a great noise called detonation; this noise being over, and the matter cold, powder it grossly, and calcine it in a covered

covered Crucible for two hours time over a great fire, then let it cool, and you'll have a Caustick matter that you must break into little pieces, and stop close in a Bottle to use as common Causticks.

If you set it in a Cellar, or other moist place it dissolves into a liquor, like the salt of *Tartar*.

Remarks.

This great detonation proceeds from the flagration of common sulphur, and that of *Arsenick*, which being violently driven about by the volatile part of *Salt-peter* finds a little hole to fly out at. The more fixt part of *Arsenick* remains at bottom with the fixt *salt-peter*. The matter is Calcined again, that being the more open, it may be the more Caustick; but this must be done in a covered Crucible; for otherwise the *Arsenick*, which is almost all of it sulphur, would fly quite away by the great fire.

Corrosive Oil of Arsenick.

This liquor is an *Arsenick* opened, and become of the consistence of butter, by the acids of sublimated Corrosive.

Take equal parts of *Arsenick*, and Sublimated Corrosive, powder and mix them, put this mixture into a glass-retort, and set it in sand; fit to it a Receiver, and luting the junctures, distil with a gentle fire a butter-like liquor, resembling the butter of *Antimony*; and when no more will distil, take

take away the Receiver, and put another in its place filled with water. Encrease the fire, and you'll see the *Mercury* fall into the water drop by drop; continue the distillation till there comes no more.

You may use this *Mercury* on all occasions, like to another, after you have washed and dried it.

The Butter of *Arsenick* is a very strong Caustick, it makes an *Eschar* more quickly than that of *Antimony*.

Remarks.

The same thing happens in this operation, that I spoke of in the Butter of *Antimony*: that is, the Spirits of Sublimate Corrosive do leave the *Mercury* to joyn with the *Arsenick*, which they draw along with them in a gummous liquor: the *Mercury* being afterwards disengaged, and finding no sulphurs to fix it, comes forth in a vapour, and condenses into water.

CHAP. XI.

Of Quick-lime.

Q*uick-lime* is a Stone, whose moisture the fire hath quite dried up, and brought into its place a great many igneous bodies. It is these little bodies that cause the Ebullition, when water hath opened the matter that kept them inclosed: and this Ebullition lasts until all the parts of the *Lime* are dilated, and the fiery particles set at liberty, so that there is no need of further trouble to get out. These little igneous bodies do likewise render the *Lime* Corrosive, for the stone is not at all so of it self.

When the stone, that *Quick-lime* is made of, is grown red hot in the Furnaces, the Workmen have a special care to keep up the fire at an equal height, until the stone is quite Calcin'd; for if the flame which has begun to burn among the stones, should be suffered to lessen for a while, and so the heat be checkt before the end of the work, they would never afterwards be able to make *Quick-lime* with those stones any more, though they should be at the charge of burning fifty times as much wood as is commonly required; and this, because in that interval of heat, the pores of the stone, which were begun to be opened, do close and shut, and the matter sinks down in a lump to the destruction of the whole. And then again the flame can't

can't rise in it any more, for it finds none of those *interstices*, or spaces between, which were frequent before, for it to pass through. The matter therefore is rendred incapable of receiving the fire any more, because all the small cells that were useful for its reception, are shut up and destroyed in this confusion.

It is objected, that if igneous bodies were they that caused the Corrosion of *Quick-lime*, *Tiles*, *Bricks*, and all stones that are not of the nature of *Lime-stone*, and *Iron*, *Copper*, *Silver*, *Gold*, and many other bodies should be as Caustick as *Quick-lime*, after having endured the fire as long if not longer than it.

But this does not follow, for *Tiles*, and other Calcined stones have not the pores disposed like those of *Quick-lime*, to retain fiery particles; and if some metals are found impregnated with them during their Calcination, they are known to retain them so well by the solidity of their parts, that neither the heat nor moisture of the flesh are able to draw them out of the places they are fixt in, to cause a Corrosion upon the part. It is easie here to give you an example; for if you take the *Calx* of *Lead* that encreased its weight in the Calcination, as I have said before, and steep it in water, the water will not act at all upon it, and the *Calx* may be taken from the water in the same weight it was put in; you must melt it by fire, if you would separate the igneous bodies: but now as for common *Quick-lime*, a small matter of moisture is able to separate the tender parts of the stone, and drive out the fiery particles in abundance.

It

It is said likewise that the ebullition of water which happens when flung upon *Quick-lime*, must not be imputed to fiery bodies, seeing neither spirit of wine, nor oil, when thrown upon it, do at all cause heat, although they are both of them Inflammable bodies, nay on the contrary they are observed to quench the heat that uses to happen to *Quick-lime* when water is joyned with it.

I Answer, that these effects do proceed from, this, that Oil, spirit of wine, and other Sulphureous liquors of the same nature, instead of separating the parts of *quick-lime*, as water does, do rather hinder any separation from being made by stopping up the pores.

That which withdrew me from the Sentiment of those who will have all the effects of *quick-lime* derived from its salt, was, that I could never find any in it, though I have sought after it with care enough; for some through mistake do take a certain Bituminous scum, which often swims upon the *Lime-water*, for a salt.

Neither can I be of the opinion of those who will needs have an acid to be in *quick-lime*, which being drawn out by the water, and meeting an alkali, does cause the effervescency which is observed, when water is poured upon *quick-lime*; for although according to appearance an acid may enter into the natural composition of the stone that *quick-lime* is made of, this acid has lost its nature, not only by breaking its points in its strict union with earth at the Petrification, but also in the violent Calcination that is given to this stone to reduce it to a *Calx*. So that we may here say, the same thing happens to the acid which enters into

into the composition of the *stone*, as I have said did happen to the salt of Vegetables and other mixt bodies, which though naturally an acid salt, changes into an alkali by means of its union with earth, and the fiery particles in time of the Calcination; there is only this difference between them both, the acid of the stone is mixed with more earth than the salt of Vegetables.

When *Lime* is once slackt, it neither causes any more ebullition, nor heat, with water; but if you add to it an acid, it makes both a considerable ebullition, and heat, because the acid edges will penetrate into the particles of the *Lime*, where the water was not able to go.

There is not made any ebullition, or precipitation, by the mixing acids with *Lime-water*.

Phagedenick Water.

This water is a mixture of Sublimate and *Lime-water*.

Put a pound of *Quick-lime* into a large earthen pan, and quench it with seven or eight pints of hot water; after the *Lime* hath infused five or six hours, and is sunk to the bottom, pour off the water by Inclination, and Filtrate it, this is called *Lime-water*.

To each pint of this water are added fifteen or twenty grains of *Sublimate Corrosive* in powder, and the water presently turns yellow; they are stirred together a good while in a glass or marble mortar, and this water is used for cleansing old Ulcers: it eats proud flesh, and is likewise used in the Gangreen,

Gangreen, by adding Spirit of Wine to it, and sometimes Spirit of Vitriol.

Remarks.

Lime-water changes the colour of Sublimate Corrosive, because being an alkali, it destroys some part of the acids, which, according as they are diversly mixed with the *Mercury*, do give it different colours.

The precipitate of the *Phagedenick water* being washed and dried, is esteemed by some to be a good Purgative in Venereal cases: It is given in Pills, for fear of blacking the Teeth: the dose is from one grain to three; it purges upward and downward, and works much like *Turbith mineral*.

Caustick stones, or Canteries.

This operation is the salt of *Gravelled ashes*, or the Lees of wine Calcined, rendred more corrosive than it was before, by the igneous parts of *Quick-lime*.

Put into a great earthen pan, one part of *Quick-lime*, and two parts of *Gravelled ashes*, or Calcined *Tartar*, powder and mix them; pour good store of hot water upon your matter, and leaving it in infusion five or six hours, boil it a little; afterwards pass that which is clear, through brown paper, and evaporate it in a Copper basin or earthen pan, there will remain at bottom a salt, which

which you must put over the fire in a Crucible, it will dissolve and boil untill all the remaining humidity is evaporated. When you find it at the bottom like to an Oil, cast it into a basin, and cut it into pieces while it is warm; put these *Canteries* quickly into a strong glass bottle, stop it with wax, and a bladder, for the air would easily dissolve it into a liquor: you must also take care to keep it in a dry place.

These *Canteries* are the strongest of all that are made; and they are but half an hour in making.

Remarks.

Gravelled ashes are only a *Calcined Tartar*, for they are made by burning the Lees of wine; but because these Lees, by reason of their liquidity have fermented more than common *Tartar*, the salt which is drawn from them is of a more penetrating nature than other *Tartar*, and consequently is fitter to make *Causticks* with. The *Quick-lime* does also help to make them much the stronger, for the igneous parts which it contains do mix with this salt, and make it the more active, and corrosive.

You must not powder the *Quick-lime*, for the little fiery bodies would then fly away, before they could be received into the water.

When you Filtrate the solution, you must put a cloth under the brown paper to support it, otherwise it would be presently corroded.

Ten or twelve ounces of salt would be drawn from the *Gravelled ashes* alone, but the flakt *Lime* retains a great deal of it.

If

If you have used in this operation sixteen ounces of *gravelled ashes*, and eight ounces of *quick-lime*, you will have eight ounces of your Causticks.

If you would have the Causticks in edges, you must put a hot Iron Spatule into the Crucible, whilst the matter is in Fusion, and form the edges in a flat bason.

This Caustick salt is very easily dissolved, and in the making of it you must not stay till it appears dry at the bottom of the vessel, as you do for other salts; for it remains still fluid, though all the humidity of it be gone; therefore you must put a little of it to cool, that you may see whether it be in its due consistence.

The reason why it thus remains in Fusion is, because it is full of little fiery bodies which it has taken from the *Quick-lime*, and which have so disposed its parts to penetration; for all solid bodies which are put in Fusion by fire do receive this liquid form for no other reason, but because the little fiery bodies are become mixed with their parts, and have set them into a great agitation.

If you should use lime that is slakt, the Causticks would not so easily melt; and if you draw the salt from *Gravelled ashes* alone, it will coagulate in drying, much as other salts do; wherefore this Fusion of the Causticks must needs proceed from the fiery bodies which were contained in the *Quick-lime*.

Causticks may likewise be made divers other ways, but this description will deserve a preference before others, when you would have them be of a quick operation.

Inks called Sympathetical.

These operations are liquors of a different nature, which do destroy one another; the first is an infusion of *Quick-lime* and *Orpin*; the second a water turned black by means of burned *Cork*; and the third is a vinegar impregnated with *Saturn*.

Take an ounce of *Quick-lime*, and half an ounce of *Orpin*, powder and mix them, put your mixture into a matrafs, and pour upon it five or six ounces of water, that the water may be three fingers breadth above the powder, stop your matrafs with *Cork*, *Wax*, and a *Bladder*; set it in digestion in a mild sand-heat ten or twelve hours, shaking the matrafs from time to time, then let it settle, the liquor becomes clear like common water.

Burn *Cork*, and quench it in *Aqua vite*, then dissolve it in a sufficient quantity of water, wherein you shall have melted a little *Gumm Arabick*, in order to make an Ink as black as common Ink. You must separate the *Cork* that can't dissolve, and if the Ink be not black enough, add more *Cork* as before.

Get the Impregnation of *Saturn* made with *Vinegar*, distil'd as I have shewn before, or else dissolve so much salt of *Saturn* as a quantity of water is able to receive: write on Paper with a new Pen dip't in this liquor, take notice of the place where you writ, and let it dry, nothing at all will appear.

Write upon the invifible writing with the Ink made of burnt *Cork*, and let it dry, that which you

you had writ will appear as if it had been done with common Ink.

Dip a little Cotton in the first liquor made of *Lime* and *Orpin*, but the liquor must be first settled and clear; rub the place you writ upon with this Cotton, and that which appeared will presently disappear, and that which was not seen will appear.

Another Experiment.

Take a Book four fingers breadth in bigness, or bigger if you will: write on the first leaf with your Impregnation of *Saturn*, or else put a paper that you have writ upon between the leaves; turn to t^o other side of the Book, and having observed as near as may be the opposite place to your writing, rub the last leaf of the Book with Cotton dipt in the liquor made of *Quick-lime* and *Orpin*, nay and leave the Cotton on the place, clap a folded paper presently upon it, and shutting the book quickly, strike upon it with your hand four or five good strokes, then turn the book and clap it into a press for half a quarter of an hour; take it out and open it, you'll find the place appear black, where you had writ with the Invisible Ink. The same thing might be done through a wall, if you could provide something to lay on both sides, that might hinder the evaporation of the Spirits.

Remarks.

These Operations are indeed of no use, but because they are somewhat surprizing, I hope the curious will not take it ill, that I make this small digression.

It is a hard matter to explicate well the effects I have now related, nevertheless I shall endeavour to illustrate them a little, without having recourse to *Sympathy* and *Antipathy*, which are general terms, and do explicate nothing at all, but before I begin, we must remark several things.

The first is, that it is an essential point to quench the coal of Cork in *Aqua vita*, that the visible Ink may become black with it.

Secondly, that the blackness of this Ink does proceed from the fuliginosity or sooty part of the coal of the Cork, which is exceeding porous and light, and that this fuliginosity is nothing but an oil very much rarefied.

Thirdly, that the Impregnation of *Saturn*, which makes the invisible Ink, is only a *Lead* dissolved, and held up imperceptibly in an acid liquor; as I have said, when I spoke of this metal.

Fourthly, that the first of these liquors is a mixture of the alkali and igneous parts of *Quick-lime* with the sulphureous substance of *Arsenick*; for the *Orpin* is a sort of *Arsenick*, as I said before.

All this being granted, as no body can reasonably think otherwise, I now affirm, that the reason why the visible Ink does disappear, when the defacing liquor is rubbed upon it, is that this liquor

quor consisting of an alkali salt, and parts that are oily and penetrating, this mixture does make a kind of soap, which is able to dissolve any fuliginous substance, such as burnt Cork, especially when it has been already rarefied and disposed for dissolution by *Aqua vite*, after the same manner as common soap, which is compounded of oil, and an alkali salt, is able to take away or make disappear spots made by grease.

But it may be demanded, why after the dissolution the blackness does disappear.

I answer, that the fuliginous parts have been so divided, and lockt up in the sulphureous alkali of the liquor, that they are become invisible, and we see every day that very exact solutions do render the thing dissolved imperceptible, and without colour.

The little alkali salt which is in the burnt Cork may also the better serve to joyn with the alkali of the *quick-lime*, and to help the dissolution.

As for the invisible Ink, it is easie to apprehend how that appears black, when the same liquor, which serves to deface the other, is used upon it. For whereas the impregnation of *Saturn* is only a *Lead* suspended by the edges of the acid liquor, this *Lead* must needs revive, and resume its black colour, when that which held it rarefied is intirely destroyed; so the alkali of *Quick-lime* being filled with the sulphurs of *Arsenick* becomes very proper to break and destroy the acids, and to agglutinate together the particles of *Lead*.

It happens then that the visible Ink does disappear by reason that the parts which did render it black, have been dissolved, and the invisible Ink

does also appear, because the dissolved parts have been revived.

Quick-lime and *Orpiment* being mixed and digested together in water, do yield a smell much like that which happens when common sulphur is boiled in a *Lixivium* of *Tartar*. This here is the stronger, because the sulphur of *Arsenick* is loaded with certain Salts that make a stronger impression on the smell. *Quick-lime* is an alkali that operates in this much like the Salt of *Tartar* in the other Operation; you must not leave the matrass open, because the force of this water doth consist in a Volatile. The *Lime* retains the more fixt part of the *Arsenick*, and the *Sulphurs* that come forth are so much the more subtile, as they are separated from what did fix them before, and this appears to be so, because the *Sulphurs* must of necessity pass through all the book to make a writing of a clear and invisible liquor appear black and visible: and to facilitate this penetration the book is strook, and then turned about, because the Spirits or Volatile *Sulphurs* do always tend upwards: you must likewise clap it into a press, that these *Sulphurs* may not be dispersed in the air. I have found, that if these circumstances are not observed, the business fails. Furthermore that which perswades me that the *Sulphurs* do pass through the book, and not take a circuit to slip in by the sides, as many do imagine, is that after the book is taken out of the press, all the inside is found to be scented with the smell of this liquor.

There is one thing more to be observed, which is, that the infusion of *Quick-lime* and *Orpin* be newly made, because otherwise it will not have force

force enough to penetrate. The three liquors should be made in different places too; for if they should approach near one another, they would be spoiled.

This last effect does likewise proceed from the defacing liquor; for because upon the digestion of *Quick-lime* and *Orpin*, it is a thing impossible but some of the particles will exalt, stop the vessel as close as you will; the air impregnated with these little bodies does mix with, and alter the Inks, insomuch that the visible Ink does thereby become the less black, and the invisible Ink does also acquire a little blackness.

CH A P. XII.

Of Flints.

F*lints*, as all other stones, are made by different Salts, or by acid liquors, which do penetrate and incorporate with earth, which is an alkali, so that from their mixture there does result a *Coagulum*, which by little and little does harden by means of the subterranean heat, or else do petrify by the cold. Now you must observe, that according to the quantity of earth which encounters with this acid liquor, there are made such different sorts of stones. Thus precious stones and Crystals do obtain their hardness and

transparency, from a just proportion, such as is needful to make an exact penetration, and a strict union of the acid with the earth. There are found some waters in several places, which falling upon stones do soon petrifie, as particularly in a Grot at *Arsi* in *Burgundy*. The reason that may be given of this petrification, is that these waters do contain an acid, which in passing through earths do dissolve some part of them, which is capable to make them petrifie, but the great agitation they are in whilst they run with rapidity down mountains, does hinder their coagulation; for that can never happen until these waters have fallen into some place fit for them to repose and lye still in.

Calcination of *Flints*.

This operation shews the way to open the bodies of *Flints* and *Cryſtal*, ſo that thereby they may be eaſily reduced into a powder.

Heat red-hot ſome *Flints* in the fire, and quench them in water; repeat heating and quenching them three or four times, or until they are friable, and can be finely powdered; you muſt chuſe *River-Flints*, that are full of veins of ſeveral colours.

Cryſtal is Calcined after the ſame manner, but it is more eaſily made friable than *Flints*. A liquor and Tincture may be likewise drawn from it, the ſame way I am going to ſhew for *Flints*; their virtues likewise are both alike.

Tincture

Tincture of Flints.

This operation is an exaltation of some parts of *Flints*, and salt of *Tartar* in spirit of wine.

Mix well four ounces of Calcined *Flints* finely powdered, with four and twenty ounces of Calcined *Tartar*: put this mixture into a large Crucible, cover it and place it in a wind-furnace, light a fire about it by little and little, to warm it gently, and then encrease it to the last degree. Continue it in this condition for five hours, that the matter may all the while remain in Fusion. Thrust a Spatule into it, and see if your matter begins to grow diaphanous like glass. If it doth so, pour it into a warm Iron mortar, and it will presently congeal into a hard mass, which you must powder while it is hot, and put into a matrafs very dry and hot: pour upon it Spirit of Wine Alcoholized, four fingers above the matter; stop your matrafs close with another, whose neck may be received into that which contains the matter. Lute the conjunctions well with a wet bladder, and set it in sand, give a fire under it that is strong enough to make the Spirit of Wine simmer for two days together, it will turn of a red colour; unlute your matrasses, and separating them a-sunder, decant the *Tincture* into a bottle: put new Spirit of Wine to that which remains, and digest it as before, separate the liquor that is turned red, and mingling it with the former, pour it all together into a glass body, and cover it with a head, fit to it a Receiver, and lute the junctures, distil

distil in a vaporous bath two thirds of the Spirit of Wine, that may serve for use as before, then take your vessel off the fire, and keep that which remains in the bottom of the body, in a Viol well stopd.

This *Tincture* is said to be a good remedy to open obstructions; they use it for the *Scurvy*, and in Hypochondriacal cases: the dose is from ten to thirty drops in some proper liquor.

Remarks.

The *Calx* of *Flints* doth so strictly incorporate with the *Salt of Tartar* by the Calcination, that they may be said to be converted into a Salt; and this I shall shew in the following operation.

You must use the *Spirit of Wine* highly *Alcoholized*, otherwise you will not gain the *Tincture*; you must likewise observe to infuse the powdered matter while it is as hot as may be; two thirds of the *Spirit of Wine* are distilled off, that what remains may be the redder and stronger.

Almost all Chymists will needs make this red colour to proceed from the *Sulphur* of *Flints* extracted by the *Spirit of Wine*, but it is more probable that this colour proceeds from an exaltation of the alkali salt in *Spirit of Wine*, because a like *Tincture* is made on *Salt of Tartar*.

Liquor of Flints.

This operation is a solution of *Flints* into a liquor, by the means of *Salt of Tartar*.

Take

Take the other part of your *Flints* Calcined with *Tartar*, and set it in a Cellar in a glass-pan, it will dissolve into as clear a liquor as water. Filterate and so keep it.

This liquor is said to be Diuretick, it is given from six to five and twenty drops in some convenient liquor.

If you mix an equal part of this liquor with some acid Corrosive Spirit, you'l presently turn it into a stone.

Remarks.

The *Salt of Tartar*, or the *gravell'd Ashes*, have so attenuated the *Flint*, that it becomes as soluble as they; and we see the truth of this in the operation, for the moisture of the Cellar entring into the pores of our Calcined matter dissolves it imperceptibly, and if this dissolution should be evaporated, an alkali Salt is found at bottom.

When this liquor is mixed with an acid Spirit, an Ebullition presently happens, from the acid Spirits piercing the alkali, and afterwards a stronger Coagulation is made, then when an acid Spirit is poured on the Oil of *Tartar*, because this same alkali contains more earth than does the Salt of *Tartar*.

This liquor may dissolve some Sulphureous obstructions that now and then happen, and then it provokes Urine; but if it meets with an acid humour, it causes a Coagulation, that may turn into a stone: wherefore I would not advise any body to use this Remedy, no more than the former

Tincture,

Tincture, which works only by its Salt that is mixed with the spirit of Wine.

From the Coagulation of these liquors may be sensibly explicated, how stones come to be formed in several parts of our bodies, seeing acid liquors and alkalis do so often meet within us.

The *Tincture of Flints* is used to extract the *Sulphur* of many Minerals; *Alchymists* have given it no less than the name of *Alkabeft*.

C H A P. XIII.

Oil of Bricks.

THis preparation is *Bricks* impregnated with *Oil of Olives*, and afterwards distilled.

Heat red-hot among burning Coals pieces of *Brick*, and quench them in a pan filled half full with *Oil of Olives*, but take care to cover it immediately, for the *Oil* will else take fire. Leave them in Infusion ten or twelve hours, or until the *Oil* hath sufficiently penetrated the *Bricks*, after that separate them, and when you have grossly powdered the *Bricks* imbibed with the *Oil*, put it into an earthen Retort, or glass one luted, large enough for a third part to remain empty; place it in a Reverberatory furnace, and fit to it a large capacious Receiver, lute well the conjunctions, and give a little fire at first to warm the Retort, then encrease

encrease it by degrees, until you see vapours come forth ; then continue it in this condition till there comes no more : unlute the conjunctions, and take away the Receiver, there remains in the Retort all the *Brick*, which you must fling away as useless.

Mix the *Oil* that remains in the Receiver with a sufficient quantity of other *Brick* dried and powdered, and make a paste of it, form several little pellets, and put them into a glass Retort ; set the Retort in Sand, and fitting to it a large Receiver, and luting them together, give a fire by degrees to rectifie all the *Oil*, pour it into a Viol, and keep it for use ; it is called the *Oil of Philosophers*.

It is a good Remedy applyed outwardly to disscuss the Tumours of the Spleen, for the Palsie, Phthisick, and suffocations of the mother. It may be given inwardly from two to four drops, in wine, or some appropriate liquor. Some drops of it are instilled into the Ear to dissipate the flatulent humours that are there inclosed.

Remarks.

This operation serves only to exalt the *Oil of Olives*, that being more opened by the fire, it may rarefie and dissolve humours more easily ; for you must not imagine that the *Brick* doth communicate any great virtue, it is a dry body, and wanting all active principles.

You must make a very moderate fire in this distillation, that the *Oil* may come forth in vapours ;

pours; for if it should come out drop by drop, it would not be so open, nor would it produce so good effects.

Some do rectifie the *Oil of Bricks* with Colcothar instead of *Bricks*, or else with the mass that remains after the distillation of *Aqua fortis*.

Antient Chymists have given the epithete *Philosophick* to all preparations wherein they have used *Brick*. The reason that can be given for it is, that because they call themselves the only True Philosophers, or Philosophers by way of excellence, they thought they were obliged to confer some influences of this mighty name upon *Bricks*, because they are the materials wherewith they build their Furnaces, to work at the high and mighty operation, or the *Philosophers stone*; for they pretend it is by this Operation alone that True Philosophy can be obtained.

CHAP. XIV.

Of Coral.

Coral is a petrified plant, that grows under deep hollow Rocks, in many places of the Mediterranean Sea, where the Sea is deep; or rather it is a certain shoot from a Rock, that hath received the form of a Plant. It is not true, that it is taken out of the Sea soft, as some have said. There

There are of them of several colours, as the *White*, the *Red*, and the *Black*; now and then there are found some of two colours, as *Red*, and *Black*.

The *Red* is the most common, and most in use; it is chosen of a deep colour; the *White* is more rare than the *Red*. A certain white stone very spongy, that is like unto *Coral*, is brought among us, which is mistaken for true *white Coral* by those that don't know it, but the true is not at all spongy; it is rather very compact, and as white as Ivory; *Black Coral* is the greatest rarity of them all.

If you put the branches of *Red Coral* to infuse a day or two in melted white Wax, upon hot embers, the *Coral* will lose its former colour, and become white, and the wax will assume a yellow colour. The Wax must be a fingers breadth above the *Coral*.

If you should put other *red Coral* to steep in the same Wax, it would turn brown.

If again the third time you should put *red Coral* to steep in the same wax, the wax would then become red.

The wax dissolves a little of the bituminous matter that is upon the *Coral*, and which did render it red: this operation is done only for curiosity.

Many persons do hang *red Coral* about the neck, in order to stop *Hæmorrhagies*, to purifie the blood, and to fortifie the heart. I believe that which gave occasion to think it has such excellent virtues, was its *Red* colour, which is like to that of the blood, and the heart; but experience does no way confirm, that outwardly applied, it has any such effects.

Coral

Coral is prepared by beating it on a Marble into a most fine powder, that it may the more easily be dissolved; and this prepared *Coral* is given to stop *Dysenteries*, *Diarrheas*, *Flux* of the *Hæmorrhoids*, and *Terms*, *Hæmorrhagies*, and all other distempers that are caused by an acrimony of humours, this being an alkali that destroys them; the dose is from ten grains to a drachm in Knot-grass water, or some other appropriate liquor.

Dissolution of Coral.

Take what quantity you please of *Coral* finely powdered on a Marble; put it into a large matrafs, and pour upon it distilled *Vinegar* enough to cover the matter four fingers high, there will happen a great effervescency, which being over, set your matter in digestion in warm sand for two days, stirring the matrafs from time to time. Leave the *Coral* to settle at bottom, and decant the clear liquor into a bottle. Pour again so much distilled *Vinegar* on the remainder, as before, and leave it two days in digestion; separate the clear liquor, and continue to add more distilled *Vinegar*, and to draw off the Impregnation, until all the *Coral* is in a manner dissolved. Then mix your dissolutions, and pour them into a glass Cucurbite, or else into an earthen one, evaporate in sand two thirds of the liquor, or until there appears upon it a very fine skin: Filtrate this Impregnation, and keep it in order to make the *Salt*, and *Magistery*, as I shall shew hereafter.

It may be given for the same purposes as the *Salt*, the dose is from ten to twenty drops in some appropriate liquor.

Remarks.

Red Coral is generally used, because it is thought to have more virtue than the rest, by reason of its Tincture.

The effervescency which happens, when *Vinegar* doth penetrate *Coral*, is reckoned among cold effervescencies, if there be any such; for my part, I cannot say that I ever perceived any coldness in it. In truth it is very strange, that so great an Ebullition, or motion of the parts, should not produce any sensible heat, but you must consider, that *Coral*, having large pores, may be easily dissolved, and so the acids need not jostle it very much, which would be requisite to produce any considerable heat.

Some do use in this operation the acid Lotion of *Butter of Antimony*, or pure *Spirit of Vitriol*, instead of *Vinegar*; but because these spirits do leave too great an acidity in the Preparations of *Coral*, I conceive it better to use distilled *Vinegar*.

Coral being an alkali, the acid points do stick in it, and suspending its parts, do render them imperceptible; and this is the reason that the *Vinegar* doth lose all its acidity, because the acidity did only consist in the activity of its points, which do now sheath themselves in the alkali.

If you would, by way of curiosity, distil this dissolution, instead of Evaporating it, as I have

T

said,

said, you'd gain nothing but an insipid water, because the acid is fixt with the *Coral*. This water is evaporated away, because it would serve for nothing, and would only weaken the impregnation.

The dissolution of *Perle*, *Crabs-eyes*, burnt *Harts-horn*, and all other alkali matters, is performed after the same manner; their *Salts* and *Magisteries* may be likewise made as those of *Coral*, which I am going to describe.

It is here remarkable, that the solution of this sort of alkalies in distilled *Vinegar*, smells much like spirit of Wine, and that some quantity of it may be drawn, with a very gentle fire; the reason of it is, that in the making of *Vinegar*, the acids had in a manner fixed this sulphureous Spirit, but when they do enter into the pores of *Coral*, they are forced to quit it, and so let it recover its volatility.

Magistry of Coral.

Take what quantity you please of the impregnation of *Coral*, either red, or white, made with distilled *Vinegar*, as I have said before; pour it into a *Viol* or *matrass*, and drop into it the liquor of the *Salt of Tartar*, made *per deliquium*, a Curd will appear which will precipitate to the bottom in a very white powder; decant the clear liquor, and washing your powder five or six times with water, dry it, it is that which is called the *Magistry of Coral*. Great virtues are attributed to it, such as, to revive and fortifie the heart, resist poison, stop the bloody Flux, and all other

Hæmor-

Hæmorrhagies. The dose is from ten to thirty grains in some liquor appropriate to the disease.

Remarks.

The name of *Magistery* is given only to *Precipitates*; and they are so called to express something more exquisite than ordinary.

The liquor of *Tartar*, which is an alkali salt dissolved, encountering the acid, makes it let go the particles of *Coral* that it held suspended, and so they precipitate by their own weight; this precipitate is nothing else but a *Coral* finely powdered by means of acids, which do easily divide into abundance of parts things that otherwise would seem indivisible. But you must observe here, that these preparations, instead of rendring *Coral* more effectual as is pretended, do indeed render it almost good for nothing; which is a thing easie enough to prove, if we consider that *Coral* works in our bodies by nothing else but by absorbing acids, or sharp and salt humours which do continually occasion divers diseases; for example, it stops *Hæmorrhagies* only by sweetning the keen salts which corroded the membranes of the veins, or else raised great effervescencies in the blood, so as to make it extravasate; it stops *Diarrheas*, by destroying the acrimony of the Cholera, or other humors; lastly, if it cures the falling down of the *Vvula*, and does remedy many other accidents, it is done by nothing else, but by breaking the force of the ferments which do cause them, after the same manner as it destroys the acidity of

Vinegar, or some other liquor; this being so, as there is great reason to believe it, it were far better to take *Coral* without any other preparation than that which is made on the marble, then to dissolve it by an acid, and precipitate it into a *Magistery*; for the acid or sharp humors that this *Magistery* is to encounter in our bodies, finding nothing in the medicine that is able to blunt their edges, will continue their former activity, and so no effect at all will follow.

In this Precipitation there does not appear any effervescency, because the edges of the Vinegar being broken, it has neither strength nor motion enough left to penetrate and to separate the parts of salt of *Tartar*; but if the dissolution of *Coral* had been made with some stronger dissolvent than Vinegar, such as Spirit of *Vitriol*, there would be an ebullition in the time of the Precipitation, because there would remain still action enough to the broken edges of that spirit, for to enter into the pores of the alkali salt, and to rarefie it.

Salt of Coral.

This operation is a *Coral* rarefied, and opened by the Spirit of Vinegar.

Take what quantity you please of the dissolution of *Coral* made by distilled Vinegar, as I said before, pour it into a glass Cucurbite, or earthen pan, and evaporate in sand all the moisture, there will remain at bottom a *Salt of Coral*; keep it in a Viol well stopt; it is given for the same reasons as the

the *Magistery*, the dose of it is less, being from five to fifteen grains.

Remarks,

In this Evaporation there come forth only the watry parts, and the acids adhering to the *Coral* do form a kind of *Salt*.

If you should put this *Salt of Coral* into a Retort, and distil it in sand, you would obtain a liquor that is only styptick, without any considerable acidity, which shews that the acids are destroyed, and do not come forth of the alkali, as they entered in.

CHAP. XV.

Of Common Salt.

There are three sorts of *Common Salt*, the *Fosfile Salt*, the *Fountain Salt*, and the *Sea Salt*; the first is called *Sal Gemme*, by reason of its transparency and smoothness, like to a precious stone; it is that of which whole mountains are found full in *Poland*, and other places; the second is drawn by evaporation of the waters of some Fountains, and the last from Sea-water by Crystallization or Evaporation: these three salts are of the same nature,

and have almost the same effect; they are used, not only in Aliments, but sometimes in Remedies too, such as Clysters, when they should be made very Carminative.

It is here observable, that *Sal Gemme* is a little more penetrating than *Sea salt*, that is drawn by CrySTALLIZATION, and that the *Sea salt* which is drawn by CrySTALLIZATION is more penetrating than that which is made by Evaporation of the waters.

The reason that may be given for the piercing quality of *Sal Gemme* is this, that having never been dissolved in water, it never lost any of its keenness, whereas the others do lose their more subtile edges in the waters, and this chiefly when those waters are in strong agitation, as are those of the Sea.

It is very probable, that the violent Vomiting which does so much annoy those who take a voyage to Sea, does proceed from these same subtile parts of salt, which being volatilized do fill the sea-air; for this vomiting does happen only to such who have not been used to breath a salt air, and who besides are sufficiently shook by the motion of the Sea.

The *Sea salt* which is made in *Normandy* by evaporation of Sea-water over the fire, is not so strong as that which is made at *Rockell* by CrySTALLIZATION, because in the evaporation many of the subtler parts of the Salt are lost, and a mark of that is, that if Sea-water is distilled over a fire never so small, it will not fail to carry with it some volatilized salt, which will alter its virtue, as experience hath testified several times.

But

But it doth not happen thus to Sea-salt Crystallized, for it fixes of it self, when the Salt-waters have settled for some time in places fit for their reception.

I have delivered my thoughts sufficiently touching the Origine of these three sorts of Salt, in the Remarks I made on the principles, wherefore there's no need of repeating what I then said.

Sea-salt is made at *Rockell* in salt marshes, which are places that must be of a lower situation than the sea, and the ground must be Clayie, for otherwise they would not be able to retain the salt-water that has been let into them. Thus all places near the sea are not alike proper to make salt marshes.

When the Season of the year begins to grow hot, which commonly happens in *May*, all the water is emptied that was let into the marshes for the better preserving them during the winter, then the sluices are opened to let in as much salt-water as they think fit, it is made to pass through a great many different Channels, wherein it purifies and heats, and then is let into places that are made flat, smooth and fit to Crystallize the salt.

The salt is made only during the great heats of Summer, the Sun does first evaporate some part of the water, and because after the great heat, a small wind does use to blow (as is usual near the sea) the coolness of this wind does condense and Crystallize the salt.

But if it happens to rain but two hours during the hot weather, there can no salt be made for a fortnight afterwards, because the marshes must be again emptied of all the water, to let in more in

its place, so that if it chances to rain but once again in the next fortnight, they can make no salt.

Salt is purified, by dissolving it in water, then filtrating the solution through brown paper, and afterwards evaporating the water in an earthen pan, until a very white salt does remain.

But besides the purification of salt by evaporation, it may be further purified, if instead of evaporation of the humidity, you set some of it a Crystallizing in a cool place, for very pure salt is found at bottom of the vessel, which salt may be separated from the water, and dried, and you may then evaporate again some part of the salt liquor, and set it in a Celler a Crystallizing, and so continue your evaporations and Crystallizations; but at last you must be fain to evaporate all the liquor, because at last it will Crystallize no longer, the reason whereof is, that the remaining salt is full of a fat bituminous matter, which is in a manner inseparable from it, and this it is that hinders the Crystallizing at last.

It is probable that this fat matter may come from the earth of those marshes that were spoken of.

The first Crystallized salt being put into *Oil of Tartar*, or some other alkali salt dissolved, does mix with it without making any Ebullition, because although sea salt is acid, yet its points are too gross, and have too little motion, to separate the parts of the alkali.

The last salt being dried over the fire, and mixed with some alkali salt rendred liquid, such as *Oil of Tartar*, makes a Coagulation and precipitation of a substance that appears saline and oily;

oily; this Coagulation does proceed from the mixture and adhesion of some Bituminous earth with the sea-salt and the Tartar; for the salts do easily unite with oily substances, and in them lose their activity.

Many acid Bituminous salts which are drawn by the Evaporation of certain Mineral waters, such as those of *Baleruc* in *Languedoc*, and *Digne* in *Provence*, do perform the same effects, when they are mixed with *Oil of Tartar*.

This *Coagulum* does not dissolve in water, as well by reason of the different nature of the salts it is compounded of, as the oily earth that holds them together; but it will dissolve in distilled *Vinegar*, and several other acid liquors, and then happens an effervescency, because the acid does penetrate the salt of *Tartar*, whose parts the sea-salt had no power to separate.

Calcination of Common Salt.

Heat a pot, that's unglazed, red-hot; throw into it about an ounce of sea-salt, then cover it, and it will crackle, and so fall into powder: this noise is called *Decrepitation*: when it is over, put so much more salt into the pot, and continue to do so, till you have enough. The pot must be sure to be red-hot all the while: when the crackling is over, take the pot out of the fire, and when it is cold, put the salt into a bottle, and stop it well, to hinder the air from entring in to moisten it anew. Bags full of it are applied behind the neck warm, (to consume too great a moisture

a moisture of the Brain) by opening of the pores. It is used likewise in several Chymical operations.

Remarks.

That which makes the Salt crackle, when it is in the fire, is an inwardly contained moisture, which upon its being rarefied doth force its way out with impetuosity, and finding the pores too closely shut to suffer an easie escape, doth break through the parts and open a passage. Now every thing else that hath close compact pores, will make such a noise too in the Calcination, as do glasse and shells.

If you have occasion to use Salt decrepitated, it is convenient to have it newly Calcined, because the moisture of the air does return again what the fire had driven away. But if you would keep it any time, let it be in a glasse bottle well stoppt.

For as much as this Salt is deprived of all humidity by its Calcination, it will absorb ferocities much better than common salt. It is laid hot behind the neck, to the end that opening the pores it may facilitate transpiration. A little Salt of *Tartar* may be mixed with it, to render it the more active.

Spirit of Salt.

This Spirit is a very acid liquor, drawn from Salt by distillation.

Dry

Dry Salt over a little fire, or else in the Sun, then powder finely two pounds of it, mix it well with six pounds of Potters earth powdered, make up a hard paste of this mixture with as much rain-water as is needful, form out of it little pellets of the bigness of a Nut, and set them in the Sun a good while a drying; when they are perfectly dry, put them into a large earthen Retort, or glass one luted, whereof a third part remains empty; place this Retort in a Reverberatory Furnace, and fit to it a large capacious Receiver, without luting the junctures, give a very moderate heat at first to warm the Retort, and make an insipid water come forth drop by drop; when you perceive some white clouds succeed these drops, pour out that which is in the Receiver, and having refitted it, lute the junctures close; encrease the fire by degrees to the last degree of all, and continue it in this condition twelve or fifteen hours; all this while the Receiver will be hot, and full of white clouds, but when it grows cold, and the clouds do disappear, the Operation is at an end; unlute the junctures, and you'll find the *Spirit of Salt* in the Receiver, pour it into an earthen, or glass bottle, and stop it well with wax: it is an Aperitive, and is used in Juleps to an agreeable acidity for such as are subject to the Gravel. It is likewise used for cleansing the Teeth, being temper'd with a little water, and to consume the rottenness of bones.

To make the dulcified *Spirit of Salt of Basilus Valentinus*, you must mix equal parts of *Spirit of Salt* and Wine, and set them in digestion two or three days in a double Vessel, in a gentle sand-heat.

heat. It is esteemed better than t'other to be taken inwardly, because it is less Corrosive, being corrected by the *Spirit of Wine*; the dose is from four to twelve drops in some liquor appropriate to the disease.

Remarks.

The Potters earth, is mixed with the Salt, to divide it into particles, that the fire may the more easily be able to rarefie it; for the parts which Salt consists of are so strictly united, that the utmost force of fire is not able to disengage them, until they are separated by some *Intermedium*.

The preparation that I give unto Salt, before it is put into the Retort, is longer than the common fort; but I have observed, that the Spirit comes forth with less difficulty, when the matter is prepared according to this form.

You must leave a vacuity in the Retort, and fit to it a large Receiver, for giving liberty to the spirit to circulate before it dissolves, otherwise it would break them both. Likewise the fire must be encreased by little and little, because the first Spirits do break out with a mighty violence, when they are driven too hard.

Some ways of drawing the *Spirit of Salt* without addition have been much sought after, but that is not yet well discovered. It is true indeed, *Monsieur Seignette*, an Apothecary of *Rochell*, among other excellent discoveries that he hath made on Salts, to the knowledge of which he hath particularly

particularly applied himself, brought me hither a sea-salt in the year 1672, that we distilled without addition of any thing else, by a very moderate fire, and in two hours time we drew three ounces and a half of very good Spirit, out of six ounces of salt, that we put into the Retort. After this we broke the Retort, and having powdered the Salt that remained in it to the weight of two ounces and a half, we exposed it to the air in a pan for a fortnight, and we found it reimpregnated with Spirits; we distilled it once more, and with the same ease as before, we drew half its weight in Spirit, of the same force as the former. The matter remaining in the Retort being again exposed to the air recovered new Spirits. *Monsieur Seignette* did assure me, that he had thus drawn Spirit from the same matter nine several times; which is a thing worth our admiration, and shews us very well that the air contains a spirit which forms divers things according to the different disposition of the subjects that it enters into. This salt is particular to him that shewed it me, and he prepares it himself some way that he is unwilling to discover.

Since I writ of *Monsieur Seignette's* particular way of drawing *spirit of salt*, some have Printed, that if common salt well decrepitated, and kept a good while over the fire, were exposed to the air for some dayes, and distilled without addition of any thing to it, it would yield a spirit much like that I have spoken of, and in full as great a quantity.

But if we examine the sharp liquor which is drawn this way, we shall find it of so weak a nature,
that

that it may more reasonably be called phlegm, than spirit, and the salt remains entire in the Retort; whereas *M. Seignette's* spirit of salt is full as strong as common spirit of salt, and has the very same qualities, nay I conceive it somewhat better, as not having so great an impression from fire as the other.

Again some say, it does not deserve the name of spirit of sea-salt, nor ought this preparation to be look't upon as any great mystery, because the same incorporation and augmentation happens to divers other salts exposed to the air, after drawing off their spirit.

I grant this augmentation proceeds from the spirit of the air, and I conceive it is the same spirit which produces all manner of things according to the Matrixes, or different pores of the earth it uses to meet with, as I have explicated in my Remarks upon the Principles. But because this spirit of the air has met with pores in our matter, ready disposed to make a salt much like unto common salt, and a spirit is drawn from it much like unto that which is drawn from common salt, I see no reason to doubt why this spirit should not be a true spirit of salt; all the difference is this, the salt I now speak of is not so thoroughly united to its earthy part, as common salt is, and therefore its spirits do separate with more ease; for they are drawn without addition of any thing else, and with a gentle fire, whereas those of common salt are so fixt, that they can't be driven out, without mixing a great deal of earth in order to separate all its parts, and without a very great fire.

As for the augmentation which happens to many other bodies exposed to the air, after their spirits are drawn off, I don't question the matter of fact, nor that these same substances do return into what they were before, by impregnating again with spirits of the air in some considerable time; but it is rarely found that any of them do yield so strong spirits, and so easily as our salt, and herein lies the mystery.

It is observable that the acids which are drawn by so violent a fire do very much differ from those that are made naturally, such as the Vinegars of Beer, Wine, Cider, the acid of Citron, &c. The Spirit of salt among others hath some particular difference from the rest, because it will precipitate that which *Aqua fortis* hath dissolved. This acid, according as may be judged by its effects, is compounded of stronger, and more weighty points than the rest, but they are not so sharp and piercing. And this is the reason that it jogs so effectually those of *Aqua fortis* loaded with some bodies they have dissolved, and that shaking them about it makes them let go their hold.

Some have writ, that this precipitation must not be imputed either to the weight, or the strength, no more than to the agitation, which spirit of salt may have given to the *Aqua fortis*, or to matters dissolved, but rather to the conjunction of the acidity of this spirit with the volatile and sulphureous alkali of *Aqua fortis*, or Spirit of Niter, which does by that means constrain this last to abandon the metal which it had dissolved.

But this is the way to explicate, as they say, one obscure thing by another that is much more obscure;

scure; for what likelihood is there that the volatile spirit of *Aqua fortis* is an alkali? and pray how comes it to remain in so great a motion with the fixed acid spirit of this same water without destroying or losing its nature, this is a thing that can never be conceived very easily. But furthermore supposing this spirit were an alkali, it would be still necessary to explicate mechanically, for what reason this alkali does quit the body of the metal to betake itself to the Spirit of salt; for to say merely that by the conjunction of these two spirits the *Aqua fortis* is compelled to abandon the metal that it had dissolved, is nothing at all to the clearing of the question, unless a man will needs give an intelligence to these spirits. Wherefore we must still have recourse to the agitation and jostles, for the true reason.

It is also remarkable, that the effervescency which happens when *Spirit of Salt* is cast into the solution of some bodies by *Aqua fortis*, is different from that which happens when some alkali is cast into it, the former being much more gentle than the latter.

The *Spirit of Salt* dissolves leaf gold, which *Aqua fortis* is not able to do.

When this *Spirit* is dulcified, it is mixed with Spirit of Wine, which being a Sulphur doth take off the edges of the acid, and in part hinders their motion; whence it comes to pass that this Spirit is milder by this addition, than if water had been used instead of Spirit of Wine.

The *Spirit of Salt* may be made with Salt De-crepitated, after the same manner.

CHAP. XVI.

Of Niter or Salt-peter.

IT is probable that the *Niter* of the antients was either the *Egyptian Natron*, or a salt that is found in the earth in a gray compact mass, or else the natural *Borax*, or the salt which is drawn from the water of the river *Nilus*, and many other rivers. And it may be, that all these salts are divers kinds of their *Niter*, but the *Niter* of the moderns is nothing else but Salt-peter, and this is that of which I intend to speak.

Niter is a Salt impregnated with abundance of Spirits out of the air which do render it volatile; it is taken from among the stones and earths of old ruined buildings. Some of it is likewise to be found in Cellars, and several other moist places, because the air doth condense it in those places, and easily unites with the stones.

Salt-peter is also sometimes made by the Urine of Animals, falling upon stones and earths. Nay some have thought that all *Salt-peter* comes from that cause, whereas we see every day that some of it is taken out of places, where there never came any Urine at all. This salt is half volatile, and half like unto *Sal Gemme* as I shall prove hereafter.

The great and violent flame which happens so soon as *Salt-peter* is flung upon the coals, and the

red vapours which it uses to yield when reduced into a spirit, have induced the Chymists generally to believe that this salt is inflammable, and consequently fully loaded with Sulphur, because Sulphur is the only Principle that flames; but if they had suspended their judgments herein, until they had got more experience on this Subject, they would not only have known that *Salt-peter* is not at all inflammable in its nature, but they would e'en have doubted whether or no any Sulphur does enter into the natural composition of this salt; for if *Salt-peter* were inflammable of it self like Sulphur, it would burn where there is no Sulphur, for example in a Crucible heated red-hot in the fire; but it will never flame therein, use what quantity of it you please, and let the fire be never so great. It is true indeed, if you throw *Salt-peter* upon kindled coals, it makes a great flame, but this is only through the sulphureous Fuliginosities of the coals, which are violently raised and rarefied by the volatile nature of *Niter*, as I shall prove in the Operation upon fixt *Niter*.

As for any Sulphur that is thought to be contained in *Salt-peter*, it can't be demonstrated by any Operation whatever, for the red vapours that come from it are no more inflammable than the *Niter*, when they are not mixt with some Sulphureous matter; and it is far more probable, that this salt contains no Sulphur, if we consider its cleanness, transparency, acidity, and cooling quality, which have no manner of affinity with the effects of Sulphur, which are commonly to make a body opaque, to take off acidity, and to heat.

Purifi-

Purification of Salt-peter.

To purifie *Salt-peter* is to deprive it of part of its fixt salt, and of a little bituminous earth, which it contains.

Dissolve ten or twelve pounds of *Salt-peter* in a sufficient quantity of water, let the dissolution settle, and filtrate it, then evaporate it in a glass or earthen vessel, to the diminution of half, or until there begins to appear a little skin upon it; then remove your vessel into a cool place, stirring it as little as may be, and leave it there till the morrow, you'll find Crystals which you must separate from the liquor; evaporate this liquor again to a skin, and set the vessel in a cool place, to get new Crystals; repeat the evaporations, and Crystallizations, until you have drawn all your *Salt-peter*.

Note that in the last Crystallizations, you'll have a Salt altogether like unto sea-salt, or *Sal Gemme*, keep it apart, it may serve to season meat with.

The first Crystals are the pure *Salt-peter*.

You may, if you please, dissolve and purifie *Salt-peter* several other times in water, observing every time what I said before, for to render it more white, and purifie it from its Sea-salt.

Salt-peter purified is a great aperitive, it cools the body by fixing the humours that are in too much motion, and drives them by Urine. It is given in Feavers, in *Gonorrheas*, and many other diseases; the dose is from ten grains to a drachm in Broth, or some appropriate liquor.

Remarks.

The first Purification that is given to *Salt-peter* is this: the stones and earths that contain it are grossly powdered; they are boiled in a great deal of water, to dissolve the *Salt-peter*: the dissolution is filtered, and then poured upon ashes, to make a *Lixivium*; after it hath been poured upon the ashes several times, it is evaporated and Crystallized.

The salt of the ashes which does mix with the *Salt-peter*, increases its fixt part; but that which is made without ashes is the better to make *Aqua fortis* with.

The earth from whence *Salt-peter* hath been drawn, being set in the open air, and stirred about from time to time, doth re-impregnate with a kind of Salt.

The long Crystals that we see *Salt-peter* shoot into, do proceed from its volatile part, for that which is Crystallized last, is fixt like sea-salt, and looks just like it.

Salt-peter can never be purified so well, but it will still contain a salt like unto *Sal Gemme*, or sea-salt, but in less quantity than before.

When *Salt-peter* is boiled a long time in water, and over a great fire, some part of the Spirits do fly away, and there remains at last nothing but a salt like unto sea-salt, or *Sal Gemme*, which serves to prove that *Salt-peter* is only a *Sal Gemme* fuller of Spirits than the other, as I said speaking of the Principles.

When

When you would Crytallize a Salt, you must dissolve it in a convenient proportion of water; for if there should be too much, the salt would be weakned too much, and not able to coagulate; and if on the contrary there should be too little, the Crystals would be confused. Therefore to make them fair, you must take your vessel off the fire, when you perceive a little skin upon the liquor, which is a mark to shew that there remains a little less liquor than is convenient to keep all the salt dissolved, and thus when it comes to be set in a cool place, it will not fail to fix.

Acid salts, and among them the volatile, do Crytallize in much less time than others.

Salt-peter cools the body, by reason that being an acid it depresses the humours, which by their too great motion did heat the body, and so precipitates them by Urine; for the volatile salts and sulphurs, that all bodies are full of, are easily fixed and quieted by acids.

Crystal Mineral, called Sal Prunellæ.

This operation is a *Salt-peter*, from which some of the volatile part hath been separated, by the means of *Sulphur* and fire.

Bruise two and thirty ounces of Purified *Salt-peter*, and put it into a Crucible, which you must set in a furnace among burning coals. When the *Salt-peter* is melted, throw into it an ounce of flower of Sulphur; a spoonful at a time, the matter will presently flame, and the more volatile spirits of *Salt-peter* fly away: when the flame is over,

the matter will remain in a very clear fusion. Take the Crucible out with a pair of tongs, and turn it upside down into a brass basin, very clean, and a little warmed before-hand, to dry up the moisture that might be upon it; shake about the basin to spread the matter while it is cooling, and this is called *Sal Prunella*. If you desire to have it very pure, you must dissolve it in a sufficient quantity of water, filtrate the dissolution, and crystallize it, as I have said in the Purification of *Salt-peter*.

It is accounted better than purified *Salt-peter* for Physical uses, because the Sulphur is thought to have corrected it. It is given to cool, and to work by Urine, in burning Feavers, in Quinseys, Gonorrheas, and other diseases, that proceed from heat, and obstruction: the dose is from ten grains to a drachm in Broth, or some other liquor appropriate to the distemper.

Remarks.

This Preparation is called *Sal*, or *Lapis prunella*, either because the essential salt which is drawn from *prunella* or *Self heal* hath, near upon the matter, the same virtue and figure as *Crystal Mineral*, or else because it is given in hot Feavers, whose heat is compared to that of a burning coal called *Pruna*. The *Germans* do give it the form of a *Sloe*, after having coloured it red with *Roses*.

The Antients have thought it necessary to throw *Flowers of Sulphur* on melted *Salt-peter*, to the end it might be made the more *Aperitive*; but thereby it is deprived of the more opening spirits which

which the *Sulphur* carries away along with it; thus instead of rendring it more open, and effectual, the better part of it is lost.

It is easie to perceive that this abuse is one of those that hath insensibly gained upon men, and diminishes very much from the benefits that might be received from Chymical Physick, for want of applying themselves to examine well the constituent parts of natural things, before proposing of correctives. I shall rather advise them to use simple purified *Salt-peter*, or purified from its fixt salt three or four several times, so as I have described, and I am confident, after the experience that I have often made of it, that it will better satisfie the intensions of those who use it, than when it shall have been prepared with *Sulphur*.

The diminution which is made of the *Salt-peter*, is not only of the volatile parts which are carried off with the *Sulphur*, but it is likewise of the watry part which this salt does always contain, and which does hereby evaporate.

Crystal Mineral is often counterfeited, by mixing *Roche-alom* with it during the fusion, and if those men do use a *Salt-peter* that is not very pure, this *Alom* does serve to purifie it, by causing a thick scum to separate to the sides of the Crucible, and so the *Crystal Mineral* becomes much the whiter.

This adulteration may be known, in that the *Crystal Mineral* made this way is more glittering than the other, and it is the *Alom* which gives it this colour.

Those who carry about this *Crystal Mineral* to the shops do easily enough vend it for its outward

excellency, and for the cheapness they sell it at; for Alom costs but little, but this sort wants a great deal of having so good effects as the other.

Sal Polychrestum.

This operation is a *Salt-peter* fixed by Sulphur, and by fire.

Powder and mix equal parts of *Salt-peter*, and common Sulphur, throw about an ounce of this mixture into a good Crucible, which you shall have heated red-hot before-hand, there will rise a great flame, which being over, throw into it as much more of the matter, and continue to do so, until all your mixture is used. Let the fire continue four or five hours, so as to keep the Crucible all the while red-hot, then pour out the matter into a copper well dried by the fire, and when it is cold, powder it and dissolve it in a sufficient quantity of water; filtrate the dissolution, and evaporate it in an earthen pan or a glass vessel, in sand until it is dry. You must fling away as insignificant that which remains in the filter.

If the *Salt* be not altogether so white, as we would have it, it is because it still retains some Sulphur; therefore you must calcine it in a strong fire in a Crucible, stirring it about with a Spatule three or four hours, or until it becomes very white; then repeat your dissolution in water, your filtration and evaporation; thus you have a *Sal Polychrestum* exceeding pure.

Sal Polychrestum purges ferous humors by stool, and sometimes by Urine: the dose is from half

half a drachm to six drachms in some proper liquor.

Remarks.

This Salt is properly a *Salt-peter* divested of its volatile part by *Sulphur*, it is called *Polychrestum* from the Greek word Πολύχρηστος, that is to say, good for several uses, because it is used not only to purge by stool, but by urine too, being taken to the weight of one or two drachms in a quart of water in the morning like a Mineral water. It is commonly used in Infusions of *Senna* from one scruple to four, as well to increase the strength of the Purgative, as to draw out more strongly the *Tincture* of *Senna*. Some do give it to six drachms in a pint or a quart of water, to purge strongly; but I would not advise any body to use this Purgative all alone, by reason of the vellications that it gives in passing through the stomach.

Sal Polychrestum must by no means be used until it is made very white, and very pure; for when there remains any gross portion of Sulphur, it is apt to cause *Vertigoes*, stupefaction of the Nerves, and nauseousness of the stomach.

If you used sixteen ounces of purified *Salt-peter*, and so much sulphur in this operation, you'l have at last but three ounces and a half of *Sal Polychrestum* very fine; but if you use common *Salt-peter* instead of purified, you'l have five ounces of *Polychrestum* as white as the other.

This difference of weight proceeds from common *Salt-peters* containing more fixt salt than purified *Salt-peter*.

Sal

Sal Polychrestum may be CrySTALLIZED like *Salt-peter* and other salts. Its CrySTALS are very small, and much like those of sea-salt, but only they are keener.

Monsieur Seignette an Apothecary of *Rochell* whom I have spoke of before, hath put in use a certain *Sal Polychrestum*; which seems at first to be like unto this, but when it comes to be examined, there's found a notable difference, as well in the CrySTALLIZATIONS, (and when it is thrown into the fire) as in the effects; for whereas six drachms of this sort taken, as I have said, do cause gripes in pricking the membranes of the stomach, that of *Monsieur Seignette* in the same quantity doth purge very gently without any gripes at all, as he proves in a little Treatise that he hath made touching the uses of this *Polychrestum*. And the truth of it I have found my self in several persons. The composition of this salt is known to none but himself, who having given it a reputation in the chiefest Towns of *France*, hath left some quantity of it with me to distribute, and make use of here at *Paris*.

Spirit of Niter.

Spirit of Niter is a liquor very acid and corrosive, drawn from *Salt-peter* by distillation.

Powder and mix well together two pounds of fine *Salt-peter*, and six pounds of Potters earth dried; put this mixture into a large Retort, either of earth or glass luted, set it in a close Reverberatory Furnace, fit to it a great capacious *Balon*, or Receiver, and give a very little fire to it for four or five hours, to make all the Phlegm come forth,

forth, which will distil out drop by drop. When you perceive there will distil no more, throw the Phlegm away that is found in the Receiver, and having refitted it, lute the junctures, and encrease the fire by little and little to the second degree, there will come forth Spirits, which will fill the Receiver with white clouds; then keep the fire two hours in the same degree, after that encrease it to the greatest violence you can give it, and so the vapours will come red; continue the greatest fire till there come no more, the operation will be ended in fourteen hours. When the vessels are cold, unlute the junctures, and pour your *Spirit of Niter* into an earthen bottle, which you must stop with Wax.

Spirit of Niter is used for the dissolution of metals, it is the best *Aqua fortis* that is; and the corrosive virtue of other waters of this nature doth chiefly proceed from the *Niter* that enters into their composition.

Remarks.

You might, as some do, mix four parts of Potters earth with one part of *Niter*, when you would draw its Spirit, but you will succeed better, and with less difficulty, by observing my description; for whereas the earth does here serve only as an *intermedium* to separate the parts of this salt, to the end that the fire operating more easily upon it may draw its Spirits, it is a very needless business to use more of the earth than is necessary towards this effect. Besides this over great quantity of earth

earth may serve to weaken the Spirits, and by taking up too much room may hinder the drawing so much as otherwise you would with the same Retort.

I fling away the Phlegm, because it only serves to weaken the Spirit. The white vapours do proceed from the volatile part of *Salt-peter*, and are a weaker sort of Spirit; but the red ones do come from the fixt part, and are the strongest Spirit: for which reason the fire is made so very violent towards the latter end. This *fixt Spirit* is commonly called *Salamanders bloud*. Of all Salts, *Niter* is the only one that yields red vapours.

When you use here the best *Salt-peter*, there remains nothing in the Retort but only earth.

I have boiled several times in water a good while, the earth that remained after the distillation of the *Spirit of Niter*, and after evaporation of the filtrated decoction, I could find no salt at bottom.

I have likewise observed, that out of two pounds of purified *Niter*, a pound and fourteen ounces of liquor, in Phlegm and Spirit may be drawn.

A third part of the Retort, wherein the operation is performed, must remain empty, and the Receiver must be very large; for otherwise these Spirits coming hastily forth would break all to pieces for room to move in.

Spirit of Niter Dulcified.

This operation is a Spirit of Niter, whose more subtile edges have been broken, or evaporated.

Put

Put into a large Bolt-head eight ounces of good spirit of Niter, and so much spirit of Wine well dephlegmated; set your Bolt-head in the Chimney upon a round of straw, the liquor will grow hot without coming near the fire, and half an hour or an hour afterwards, it will boil very much; have a care of the red vapours that come out a-pace at the neck of the Bolt-head, and when the ebullition is over, you'll find your liquor clear at bottom, and to have lost half what it was; pour it into a Viol and keep it, this is the sweet spirit of Niter.

It is good for the wind Colick and the Nephritick, for Hysterical distempers, and for all Obstructions; its dose is from four to eight drops in broth or some other convenient liquor.

Remarks.

You must leave the Bolt-head open; for the vapours would either carry away the stopple, if there were one, or else they would break the vessel; the Bolt-head is so hot during the ebullition, that one can't endure ones hand upon it.

The heat and ebullition begins sooner or later, according as the Spirits that are used have been more or less dephlegmated; or else according as the season, in which it is made, is either hotter or colder, for in the winter you must warm the liquor in a gentle sand-heat, and when it grows a little hot, you must take it off, and shake it, thus it will come to boil.

This

This effect is very strange, for spirit of Niter being a strong acid, and spirit of Wine a sulphur, it can't be said that there is here any alkali, to cause the ebullition with acid, according to the common maxim. And this operation shews us that every thing can't be explicated by the sole Principles of acid and alkali, as some do pretend.

This operation has much resemblance with that which happens when oil of Turpentine is put into a bottle with oil of Vitriol; for the mixture of these liquors does heat and boit much alike. I shall say something of this last mixture hereafter. There is this difference notwithstanding, that spirit of Niter being more volatile than oil of Vitriol, causes a greater effervescency.

In order therefore to explicate this ebullition, two things must be considered. First, that spirit of Niter contains a great many fiery parts lock'd up in its acidity, but which do still retain some evident motion, for it is they that make the spirit of Niter to Fume as it does.

The second is, that spirit of Niter is more Inflammable than *salt-peter*, when mixed with any sulphureous body, and the reason thereof is, that it is more rarefied than *salt-peter*.

Thus when this acid spirit is mixt with spirit of Wine, which is a sulphur very much exalted, and very susceptible of motion, the volatile part of the spirit of Niter joyns itself to this sulphur, and the mixture becomes very ready to take flame; likewise after this mixture the fiery bodies that were in spirit of Niter, do by striving to mount upwards put the liquor into so great a motion, that it e'en almost flames, and would without all

que-

question quite flame, if there were not some phlegm always mixed with these spirits, let them be drawn never so pure, which serves to allay the activity of the fiery particles; so that there must needs follow a very great ebullition.

This effervescency therefore proceeds from this, that spirit of wine, and spirit of Niter, which are as it were a *salt-peter*, and sulphur highly exalted, have been almost kindled into a flame by the fiery bodies that were in spirit of Niter; and that which further proves this conception is, a noise or kind of detonation, during the effervescency, which is much like that which happens when sulphur and *salt-peter* are burnt together.

But because there may be some difficulty in conceiving what is meant by little fiery bodies, I do understand by them a subtile matter which having been put into a very rapid motion does still retain the aptitude of moving with impetuosity, even when it is inclosed in grosser matters; and when it finds some bodies which by their texture or figure are apt to be put into motion, it drives them about so strongly that their parts rubbing violently the one against the other, *heat* is thereby produced.

Now the sulphureous parts of spirit of Wine, and the volatile acids of spirit of Niter being mixed, and being very aptly disposed for motion of themselves, they must needs be easily put into it by these fiery bodies, insomuch that their parts often rubbing or striking the one against the other, they must cause a heat after the same manner, as when a stone is strook hard against a piece of Iron, a heat and fire do follow.

The

The great diminution of the liquor proceeds from the evaporation of the more volatile parts of the *Spirits of Wine* and *Niter*, through the neck of the Bolt-head during the ebullition.

That which remains is a well *sweetned spirit of Niter*, for not only its edges are very much blunted in the ebullition, but the *spirit of Wine* being a sulphur does unite and imbody with those that remain, so that they have no longer any Corrosive quality.

Aqua Fortis.

This preparation is a mixture of the *Spirits of Niter* and *Vitriol*, drawn by fire, to dissolve metals.

Powder and mix *Salt-peter* purified, *Vitriol* Calcined white, as I shall shew hereafter, and *Potters earth*, or clay dried, of each two and thirty ounces: put this mixture into an earthen Retort, or glass one luted, whose third part is to remain empty; place your Retort in a close Reverberatory Furnace, and fitting to it a capacious Receiver, Lute well the junctures: then begin by giving a little fire to warm gently the Retort, and encrease it by little and little; but when you perceive the *Spirits* to come forth into the Receiver in red clouds, continue it for fifteen or sixteen hours in the same degree, then drive it to the last extremity, until there do appear white clouds instead of red. Then let the vessels cool, and unlute them, you'll find in the Receiver an *Aqua fortis*, which you must keep in an earthen bottle well stopd. It serves for the dissolution of metals.

Remarks.

Remarks.

I do use to Calcine the Vitriol to a whiteness, that the *Aqua fortis* may not be weakned with an insipid water.

The mixture of Vitriol and Salt-peter has quickly some smell of *Aqua fortis*, because Vitriol contains a great deal of Sulphur, which easily insinuates into the volatile part of Salt-peter, and exalts some little of it, which causes the smell; it is this Sulphur in Vitriol which by volatilizing the red spirit of Niter, makes it come forth faster, and with a less fire, than when Salt-peter is distilled with Clay alone.

The greatest Corrosion of *Aqua fortis* proceeds from the *Niter*, for the *Vitriol* doth yield but very weak Spirits in comparison with the other. I do acknowledge indeed that the *Oil of Vitriol* is exceeding Corrosive, but eighteen or twenty hours are not able to drive that out, for it doth not use to come until after three days continual distillation. The *Vitriol* then and the Clay do serve here only for a matter to separate the *Salt-peter*, that it may by the means of fire, the better rarefie into Spirits.

Although there does not enter into this preparation so much terrestrial matter, as there does into that of *Spirit of Niter*, nevertheless it proves very well, because the Sulphurs of *Vitriol* do help the Spirits to rise.

If you would keep on the fire five days and nights together, the Receiver would be still full

of clouds, because the *Vitriol* would yield some Spirits during all that time.

Sometimes *Alom* and *Arsenick* are added to the composition of *Aqua fortis*, but the description which I have given you is the best of all.

There remains in the Retort a red mass, which may be used like *Colcothar*, for an Astringent.

This mass may be obtained without breaking the Retort.

*Fixation of Salt-peter into an Alkali Salt,
by the means of Coals.*

This operation is a *Salt-peter* rendered porous by Calcination, and by the ashes of coals, which are mixed with it.

Melt sixteen ounces of *Salt-peter* in a strong and large Crucible among burning coals, throw into it a spoonful of coals grossly powdered, and there will rise a flame and detonation, which being over, throw so much more, and continue to do so until the matter flames no longer, but remains fixt in the bottom of the Crucible; then pour it into a warm mortar, and when it is cold, powder it and dissolve it in a sufficient quantity of water; filtrate the dissolution through brown paper, and evaporate all the water in an earthen pan in sand, there will remain a very white salt, which you must keep in a Viol well stopd.

This Salt hath a taste like to that of Salt of Tartar, and they differ but little in virtue; it opens Obstructions, and works by Urine, and some-

sometimes by Stool ; the dose is from sixteen to thirty grains in some convenient liquor.

It may be used to assist in drawing forth the *Tincture of Senna*, a red Tincture may be also drawn from it with Spirit of Wine, as from Salt of Tartar.

If this Salt is set in a Cellar, it dissolves into a liquor like the Oil of Tartar : it is used to extract the Tincture of Vegetables and Minerals.

Remarks.

The Crucible must be but half full of *salt-peter*, because the detonation is so great, that the matter would be driven out of the Crucible, if too much be put in. When the Crucible is not very strong, it breaks in pieces about the middle of the operation, and some part of the matter is lost thereby.

This detonation is more violent than that which is made with a mixture of *salt-peter* and common sulphur, because the sulphur of Coals is more rarefied than common sulphur.

Niter will never flame, when set over the fire alone in a Crucible, though you make your fire never so strong, and coals though loaded with fuliginous or oily parts, do send forth but only a small blue flame ; but when these two bodies come to be mixt together, the volatile parts of *Niter* joyning with the coals, which are oily, do rarefie and exalt the coals with such violence, that they produce a very great flame. Now this operation confirms my opinion that *salt-peter* does only serve here to rarefie the flame of sulphur, but cannot send

forth the least flame of itself; because that as soon as ever the coals, you put into the Crucible, are burnt, the flame goes out, and appears no more until you throw in more coals, with which a convenient proportion of the volatile parts of *salt-peter*, that still remained, does joyn and rarefie them into a flame. Thus new coals are successively thrown into the Crucible, until it flames no longer; but toward the end of the operation, because there remain but few volatile parts in the *Niter*, the detonation is much the less, and so is the flame, until at last the coals finding nothing more in *salt-peter* for it to raise, do burn only as they use to do when alone.

If you use common *salt-peter* for this operation, you'l have occasion to use but three ounces and a half of coals, and you'l get twelve ounces of purified salt, but if you use fine *Salt-peter*, you must have seven ounces of coals, and yet will get but three ounces of purified salt.

This difference of weight proceeds from the fine *salt-peters* containing more volatile parts than the other; likewise a great deal more coals is required to raise them, and there remains the less *fixt salt* for the same reason.

The *fixt Niter* being prepared as I have described, it is a little gray coloured; now to make it white you must Calcine it in a great fire, stirring it in the Crucible all the while with a *spatule*; when it shall have continued red hot for above an hour, it will become exceeding white. You must then dissolve it in water, filter the dissolution, and evaporate the water, and thus you have a very pure and white salt.

This

This salt is an alkali, being a mixture of the salt of coals, which is an alkali, and *sixt salt-peter*; these two salts are so strictly united and mixed together in the Calcination, that they make a porous salt, and such as is much like unto the *sixt salt of Plants*,

Not that there is an alkali salt in *salt-peter* as Chymists will have it; for give what Calcination, or other preparation you please to this mineral salt, without adding any thing to it, not the least alkali can be drawn from it, and all that ever we can see in it is acid.

It is further observable, that the liquor of *sixt Niter*, which has been made with common salt-peter, being kept a year, or a year and a half, loses most of its activity as an alkali, so that it is no longer able to cause any such ebullition with acids, as it could before:

This accident can have no other cause, than that the pores of salt contained in the liquor do close up by little and little, and the acid salt of *Niter* does absorb and destroy the alkali, which kept the pores open.

But the same thing does not happen, where the liquor of *sixt Niter* was made with *purified salt-peter*, because whereas a great deal of coals was used in the fixing it, and but little salt of *Niter* remained in it, the alkali must there predominate so powerfully, that the acid is not able to regain its strength.

Some Chymists have thought fit to call the liquor of *sixt Niter*, *Alkahest*, that is, an universal dissolvent, thinking it able to draw out the sulphureous substance of all mixt bodies.

C H A P. XVII.

Of *Sal Armoniack*.

S*al Armoniack* is either Natural or Artificial. The Natural is found in very hot Countries, such as many parts of *Africa*, that are near the *Torrid Zone*. It is found upon the earth that hath imbibed the Urine of Animals, that is to say, where the Sun hath sublimed the volatile Salt of this Urine, and made of it a *Sal Armoniack*.

The Artificial *Sal Armoniack* is made at *Venice*, and divers other places with five parts of Urine, one part of *sea-salt*, and half a part of *Chimney soot*; these three are boiled together, and reduced into a mass, which being put into subliming pots, over a gradual fire, it sublimes into a Salt in the form we commonly see *Sal Armoniack*. Now in this sublimation the volatile alkali salts of the *Soot* and *Urine* do raise up as much *sea-salt* as they can, and do join so strictly together with this acid salt, that the mixture seems to be fixt. The reason of this close union is, that *sea-salt* being in form of points, does insinuate into the alkali salts; and because it has not motion enough to separate the parts of these salts, it gets within them, and fills their pores.

If you would purifie *Sal Armoniack*, you must dissolve it in a sufficient quantity of water, filtrate the dissolution, and evaporate it until it is dry in a glass

glass vessel. You'l have a white salt, which may be given from six to four and twenty grains in some convenient liquor. It is an excellent Sudorifick and Diuretick; it is good in Malignant feavers, and in Quartan agues, and to bring the *menfes* in women. It is also used in some *Collyries*, or waters for the eyes.

Flowers of Sal Armoniack.

These *Flowers* are a part of *Sal Armoniack*, raised by Fire.

Powder and mix together equal parts of *Sal Armoniack* in powder, and *sea-salt* decrepitated; put this mixture into an earthen Cucurbite, and having placed it in sand, fit to it a blind head. You must give a gentle fire at first, and encrease it by little and little, so long as you perceive the *Sal Armoniack* to rise up like meal, and stick to the head, and the uppermost part of the Cucurbite: continue the fire, until nothing more rises up, then let the vessels cool; lift up the head gently, and gather your *Flowers* with a Feather; keep them in a Viol well stoppt; they have the same virtue as *Sal Armoniack*, but are given in a little less dose, as from four to fifteen grains.

Remarks.

This operation is performed, to the end the *Sal Armoniack* may be volatilized, by checking some part of its *sixt* salt by the addition of *Salt decre-*

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pitated,

pitated, thus these *Flowers* are a little more active than the *Sal Armoniack*, though they are both compounded of the same Salts.

Iron or Steel powdered may be used instead of Sea-salt, as *Schroder* describes it, and then the *Flowers* do become of a Yellow colour, because the Salts do take the *Tincture of Mars*.

And these last *Flowers* are a little more penetrating than the others.

Aqua Regalis.

This water is a solution of *Sal Armoniack* in *Spirit of Niter*.

Powder four ounces of *Sal Armoniack*, and put them into a matrafs, or other glass vessel of a good bigness; pour upon it sixteen ounces of *Spirit of Niter*, place the vessel in sand a little warm until the *Sal Armoniack* is all dissolved, then pour the dissolution into a bottle, and stop it with wax, this is *Aqua Regalis*; you will have seventeen ounces of it.

Remarks.

This water is called *Regalis*, or Royal, because it dissolves Gold, which is the King of metals. It is likewise called *Aqua Stygia*, or *Chrysulca*.

The vessel in which it is made must be of a sufficient bigness, because in the dissolution the Spirits do rarefie with so great violence, that they would break it, if they had not room to circulate in; when

when a great deal of this water is preparing at a time, you must take care to remove the vessel from the fire, so soon as the dissolution begins.

Aqua Regalis may be likewise made, with equal quantities of *Salt-peter*, and *Sal Gemme*, by mixing these Salts with thrice as much Potters-earth powdered, and the distillation of it is made after the same manner as I shewed, to draw the *Spirit of Niter*.

It is somewhat difficult to conceive how *Aqua Regalis* is able to dissolve Gold, which is a most solid Metal, and cannot dissolve Silver, which is a much less solid body. Some Chymists endeavouring to resolve this difficulty, have said that Gold being a Metal fuller of Sulphur than Silver, did therefore require a sulphureous dissolvent, such as *Aqua Regalis*, compounded of the volatile sulphureous salts of *Sal Armoniack*: but this explication destroys itself, for if Gold did contain more Sulphurs than Silver, it would consequently be less weighty, for *Sulphur* is one of the lightest Principles in Chymistry.

I know the Alchymists will tell me, that their Sulphur is quite of a different nature from the common sort, and that they do conceive in Gold, a Fixt, and consequently a heavy sulphur. But besides that a fixt sulphur is a thing meerly imaginary, it can never be so heavy as the other principles which they pretend to be in Gold, and which they are forced to think as fixed as the Sulphur.

Moreover if we examine what happens in the composition of the dissolvent of Gold, it will be no difficult matter to contradict this opinion: for we see that as soon as ever the *Spirit of Niter* begins

gins to work upon the *Sal Armoniack*, the acid salt joyns with it, and quits the volatile salts, which finding themselves disingaged from the bodies that held them in a manner fixed, do rise up with violence; but because these salts which are alkalies, do meet in their passage with some acids of the *Spirit of Niter*, the great effervescency happens which is always wont at the meeting of alkali salts and acids. This effervescency being over, our *Aqua Regalis* remains in the vessel: it is properly nothing else but an acid *sea-salt* dissolved in *Spirit of Niter*, the volatile salts being either exalted, or destroyed by Acids, and that which confirms this opinion is, that *Aqua Regalis* is as well made with *sea-salt*, in which there are no volatiles at all, as with *Sal Armoniack*, according as I have said.

It is not then by discourses of this nature, that this *Phenomenon* can be clearly explicated. I am apt to believe, with more likelihood, that if *Aqua Regalis* be not able to dissolve Silver, the reason of it is because the edges of the *Spirit of Niter* being magnified by the addition of Salt do slide over the pores of Silver, not being capable to enter into them by reason of the disproportion of their figures, whereas they easily enter into Gold, whose pores are larger, to make their divisions. On the contrary if the *Spirit of Niter* dissolves Silver, it is because its points are very subtle and fitly proportioned to enter into the small pores of this metal, and by their motion to divide its parts. These same points may likewise enter into the large pores of Gold, but they are too small and pliable to act upon this body. There's need of stronger and keener knives, which by filing

ling its pores more advantageously may have force enough to divide it.

I do easily foresee, it will be objected, that Gold being heavier than Silver, should have lesser pores and not greater, because the weight of a body doth only consist in the proximity of parts; but it is easie to solve this difficulty, by considering each metal with a good Microscope, for the pores of Gold are seen to be much larger than those of Silver, though indeed there are much fewer, and that will explicate very well why Gold is heavier than Silver, though its pores are greater; for seeing they are at a good distance the one from the other, there's a very compact matter as it were intercepted, which causes all the weight; but the pores of Silver being very near one another, and of a much greater number, do intercept less solid matter, and consequently it must be lighter. I'll use a familiar example, to make my self more plainly understood.

If you take two vessels of the same size and bigness, and fill one with small hail-shot, and the other with large bullets, that which holds the bullets will be much heavier than that which is full of shot; and yet notwithstanding the vacinities between the bullets are much larger, than those between the shot.

According to this *Hypothesis*, reason may be likewise given, why Gold is cut in pieces more easily than Silver; for the greater the pores of a body are, the easier entrance will a pair of Sheers meet with.

Gold spreads under the hammer more than Silver, because having larger pores the hammer makes

makes a greater impression into it, and dilates the parts the more easily.

It is objected, that if there be any heavy matter as it were intercepted between the pores of Gold, it must needs precipitate of itself, after the action of *Aqua Regalis* upon this metal, which is a thing that does not happen.

I answer, that if the parts of Gold are heavy, the dissolvent nevertheless is a gross body, and very well proportioned to hold up those heavy parts, and to hinder them from precipitating.

Others have opposed this explication, and have writ, that if *Aqua Regalis* dissolves Gold, and cannot dissolve Silver, the reason of it is, that the gross points of *spirit of Niter*, or *Aqua fortis* are subtilized by the mixture of *sal Armoniack*, and are rendred fit to enter into the small pores of Gold, whereas the delicate Fabrick of these same points does not leave them the necessary strength nor motion to divide the parts of Silver, whose pores are a great deal bigger.

But this way of arguing does not agree with experience; for what likelihood is there that the points of *spirit of Niter* are so subtilized by the penetration and division of the parts of *sal Armoniack*? or where shall we find any example, that after a considerable effervescency of two salts met together in conflict, the acidity grows sharper than it was before? this is a thing that can never be proved. On the contrary, every body knows well enough that no effervescency happens but the acid is in part blunted or broken thereby. Moreover the Argument supposes that *spirit of Niter* does break its subtilest points in violently con-

tending

tending with the *Sal Armoniack*, since also that in *sal Armoniack* there are alkali salts whose property it is to destroy acids. I could further add here, that the conjunction of salt with *spirit of Niter* should of necessity render its points more gross than they were, and that the Crystals which are drawn by *aqua Regalis* have their shape not so keen as those that are drawn by *aqua Fortis*. But that which I have said is so probable in itself, and so easie to be convinced of, if a man takes never so little pains to consider it, that I should but amuse my Reader to little purpose, if I should offer to give any proofs of it.

Neither do I find it convenient to make a long discourse in explicating how Silver, which has lesser pores, is more susceptible of the impressions of Air and Fire, than Gold which has larger, seeing I have already supposed that the matter intercepted between the pores of Gold is more compact, and consequently more hard to separate than that of Silver.

Volatile Spirit of Sal Armoniack.

This preparation is a volatile salt raised from *sal Armoniack* by the means of *Quick-lime*, and dissolved into a liquor.

Take eight ounces of *sal Armoniack*, and four and twenty ounces of *Quick-lime*; powder them apart, and when you have mixed them in a mortar, pour upon them four ounces of water, and put it quickly into a Retort, whose half must remain empty. Set your Retort in a sand Furnace, and
fitting

fitting to it a great Receiver, and luting the junctures exactly, begin the distillation without fire, for a quarter of an hour; afterwards increasing it by little and little unto the second degree, continue it until nothing more comes forth; take off your Receiver, and pour out the Spirit immediately into a Viol, turning away your head as much as may be to avoid a very subtil vapour that continually rises from it. Stop the bottle close with wax, to keep the Spirit in; you will have of it five ounces, and six drachms.

It is an excellent Remedy for all diseases that proceed from Obstructions, and corruption of humours, such as Malignant feavers, the Epilepsie, Palsie, Plague, Small-pox, &c. It drives by perspiration, or by Urine: the dose is from six drops to twenty, in a glass of Balm, or Carduus water.

Remarks.

Quick-lime, which is an alkali, destroys the strength of the acid Sea-salt, which in a manner bound up the volatile salts in the *Sal Armoniack*, whence it comes to pass, that as soon as *Lime* and *Sal Armoniack* are mixed together, there exhales an unsufferable smell of Urine; for the volatile salts coming forth abundantly do so fill the Nose and Mouth of the Artist, that he would never be able to put the mixture into the Retort, if he did not take good care to turn away his head, while his hands are at work.

Water

Water is added to it to liquifie these volatile salts, for if there were nothing to moisten them, they would suddenly sublime to the neck of the Retort, and stopping it all together would break it to pieces.

You must stop the Retort with your hand, so soon as you have poured the water into it, and shaking it one minute, you must hasten all you can to fit to it the Receiver, and to lute well the junctures; for the *Quick-lime* does presently grow hot, so soon as its body is opened; and this heat, which is very considerable would spend the more volatile of the salts, if there were no care taken to preserve them.

The *Quick-lime* being wetted does swell, and take up a great deal of room; wherefore the Retort must be filled but half full, that there may remain room enough for the Spirits to rarefie in; you must also use a large Receiver, in which the vapours that rise in abundance may be able to circulate with ease.

This Spirit is nothing but a solution of volatile salts in water; if you would sublime, and separate it from the water, you must put the liquor into a matrafs with its head, and proceed as I shall shew when I describe the volatile salt of *Vipers*; but this salt being dry, flies away more easily than when it continues dissolved in water, so that it were better keep it as it is.

This is a stronger Spirit than that which is prepared with *Salt of Tartar*, because the little fiery bodies of the *Quick-lime*, which are mixed with it, have quickned the motion of the volatile salts; likewise these fiery particles are they that do hinder

hinder the coagulation of this Spirit with *Spirit of Wine*, when they are mixed together, for there must be a cohesion and repose of parts, in order to make a *Coagulum*.

You must also have a care when you remove the Receiver, not to hold your head over it; for this volatile salt suffering a greater separation than before, enters the Nose immediately, and hinders Respiration; insomuch that several persons have been seen to fall in a swoon by that means alone. Now to avoid this accident, you had best have ready a wet cloth, to stop the Receiver with, so soon as it is unluted.

This Spirit is an excellent *Menstruum* to make precipitations with, it destroys acids exceeding well, as do all other volatile alkalis; it is used to precipitate Gold, after it is dissolved.

It is good in those diseases I named, because it opens the pores, and drives the humours by perspiration, or by Urine, according to the disposition of bodies: moreover, as it is an alkali, it destroys the acids which caused these diseases.

Again, it sometimes causes sleep, because it dulls the keenness of acid salts, which entering into the little conduits of the Brain, do cause perpetual watchings.

It is better give volatile Spirits in Sudorifick waters, than broth, because the broth being taken hot, the heat would evaporate the better part of the volatile Spirits, before a man could reach the Porringer to his mouth.

You will find in the Retort thirty ounces of a white matter, which you must throw away as useless; it is the fixt salt of *sal Armoniack* mixed with the *Quick-lime*.

Another

*Another Preparation of the Volatile Spirit of
Sal Armoniack, together with its Flowers,
and Fixt Salt against Feavers.*

Powder and mix together eight ounces of *Sal Armoniack*, and so much *Salt of Tartar*; put this mixture quickly into a glass body, and sprinkle it with three ounces of Rain-water, set a head upon it, and after fitting the Receiver, and luting the junctures close with a wet bladder, place your vessel in sand, with a gentle fire at first to warm the Retort by little and little, and distil the Spirit drop by drop; but when you perceive there will distil no more, take away the Receiver, and stop it close: then encrease the fire to the third degree, and continue it about two hours, there will sublime the *white Flowers of Sal Armoniack*, which will stick about the bottom of the head like meal.

The Spirit hath the same strength, and virtues as the former: you will have seven ounces of it, and a half.

Gather up the *Flowers* with a Feather, and use them as you would those I described before the Preparation: you'll have of them ten drachms, and a half.

There remains at the bottom of the Cucurbite nine ounces, and three drachms of a white fixt mass. You must dissolve it in sufficient water, then filter the dissolution, and evaporate it, until it is dry, you'll have a very white Salt, that may be reckoned a good Remedy for intermittent

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Feavers:

Feavers : the dose is from eight grains to thirty in the small Centaury water, or some other convenient liquor.

Remarks.

The *Salt of Tartar* serves in this Operation, as the *Quick-lime* did in the other ; but because it is a more powerful Alkali than *Quick-lime*, you must not use so great a quantity of it. The fixt Salt of *Niter* might be substituted in its place, or any other Alkali that you will.

When the fire begins to heat the matter, there do rise up into the head store of volatile Salts, in a fine delicate Crystalline form, but the moist vapours coming upon them do dissolve them into Spirit.

The Volatile Spirit of *Sal Armoniack* is then a dissolution of Volatile salt in water, and if there be not phlegm sufficient to dissolve all the Volatile salt, there will remain some part of it at bottom of the Receiver, and that may likewise be turn'd into Spirit, by only adding enough water to dissolve it. Thus the Spirit becomes as strong as it can be made, for the pores of the water being filled with as much salt as they can contain, it can receive no more. But if there happens to be more water than the proportion of Volatile Salt requires, then the Spirit proves weak, and must be given in a larger dose.

This Spirit is Sudorifick, but you may perceive more sensibly the effect of *Sal armoniack* to cause Sweat, by dissolving six or eight grains of this salt, and the same quantity of *Salt of Tartar*, each separately in two small doses of some proper liquor,

quor, and giving them to a Patient one presently after the other; for the *salt of Tartar* working upon the *Sal Armoniack* in the stomach, after the same manner as it does when they are mixt together in a Mortar, the Spirits do separate from the latter with the more force, and act more powerfully, than when they were mixed, before they were given; for the little violence that the Volatile Spirits do use in their separation from sea-salt, does leave them the more activity, and disposes them the better to pass through the pores. Again, it is probable, that in the former effort which these Spirits made in their separation from the fixt part, when *Sal Armoniack* was mixt with *salt of Tartar* in a mortar, the more subtile part might fly away first, and be lost; now it is this subtile portion that is most proper to rarefie the humours, and to drive them forth by Transpiration.

The flowers do proceed from some part of the *Sal Armoniack*, which the *salt of Tartar* had not sufficiently opened.

The Febrifugous salt is nothing but a mixture of *salt of Tartar*, and the fixt and acid part of *Sal Armoniack*, it works by Urine, and but seldom by Sweat, by reason that being fixed it precipitates more easily than it rarefies; and it is by this means that it opens obstructions, which are often the first cause of Feavers.

If you mix in a Viol equal quantities of Volatile Spirit of *Sal Armoniack*, & *Spirit of Wine*, and shake them a little together, they will cause a *Coagulum*.

This Coagulation proceeds from hence that the *Spirit of Wine*, which is a rarefied Oil, does unite with the Spirit of *Sal Armoniack* which is a saline

liquor; and it is but the same thing which happens from stirring Oil and some salt liquor in a mortar, in order to make an Unguent, called *Nutritum*.

By this incorporation together, the salt is involved in the ramous parts of the sulphur, and these same sulphureous parts are checkt, or as it were fixed by the salt, so that neither of them have any more freedom of motion; and from this repose of these parts does result the *Coagulum*.

It may be likewise said that the conjunction of the acid that is in *Spirit of Wine* with the volatile *Armoniack* alkali, does contribute much to this Coagulation.

The Spirit of *Sal Armoniack* prepared with *Quick-lime* does not at all coagulate with Spirit of Wine, by reason of fiery parts that it contains. The *Salt of Tartar* too may have mixed some fiery bodies in the Spirit of *Sal Armoniack*, but there are not enough of them in it to hinder its adunation with Spirit of Wine.

Volatile Spirit of Sal Armoniack dulcified.

This Operation is a volatile *Armoniack* salt mixed, and dissolved in Spirit of Wine.

Take *Sal Armoniack*, and *Salt of Tartar*, of each four ounces, powder them separately and mix them well in a glass, or marble mortar, put this mixture into a glass body, pour upon it ten ounces of rectified Spirit of Wine, stir it all together with a wooden Spatule, and fit to the body a head, and Receiver, lute well the junctures, place the vessel in

in a Sand-furnace, and give it a very little fire, to warm the body. The volatile salt will rise, and stick to the head, and neck of the receiver. Increase the fire a little, and continue it, until there distils nothing more, the operation is ended in four or five hours. Let the vessels cool, and unlute them. You will find a volatile salt stuck to the head, and a spirit in the receiver. Put quickly both the one and the other into a Retort in sand; and after having fitted another Retort to it to serve for a Receiver, and having luted the junctures, distil the whole with a small fire. Cohobate it again three times, then keep what you have distilled in a bottle well stoppt, almost all the volatile salt will be dissolved in the Spirit of Wine, and that which remains undissolved will receive a perfect dissolution in the bottle.

It is a very good Medicin for the Lethargy, the Palsy, the Scurvy, Malignant feavers, and Hysterical maladies; it may be given instead of Spirit of *Sal Armoniack* before described. And it is not so repugnant to the taste. It works by Sweat, or by insensible Transpiration; the dose is from twelve drops to thirty, in some proper liquor; it is likewise good, outwardly applied, for the Palsie, and for cold pains.

Remarks.

So soon as the *Sal Armoniack* is mixed with the salt of *Tartar*, Volatile salts do rise from them, which would very much incommode the Artist if he should hold his nose over it. You must lose no

time in putting the mixture into the body, and then stopping it, for these first salts are the most subtil of all.

The salts must be separately powdered, by reason of the loss which would be made of the volatile salts, in the mixing of the *Sal Armoniack* with the salt of *Tartar*.

In the making this mixture, you must not use any mortar made of metal, because that in the conflict of the two salts it would be corroded, and that which were corroded from it would be apt to spoil the operation.

The body must be filled but half way, when the whole is in. The volatile salt is lighter than the spirit of Wine, for it rises first.

When the Spirit of Wine is well rectified; it will not dissolve any of the volatile salt at first, but on the contrary it hinders this salt from dissolving in a liquor, because the ramous parts of the wine do stop the entrance of the air, but if there be any phlegm in the Spirit of Wine, it dissolves the salt according to the proportion that there is of it.

Those who had rather use the volatile *Sal Armoniack* dry, then in liquor, may keep it dry in a bottle well stoppt, and use it for the same purposes as the spirit; the dose of it must be a little less, it is very white and pure, this keeps better than that which is drawn with water, because an impression of Spirit of Wine which remains in it, does serve to retain the salts in some measure.

You need not wonder, that there happens no *Coagulum*, when Spirit of Wine and this volatile salt are stirred together in a bottle, as there does
by

by the mixture of Spirit of Wine, and Spirit of *Sal Armoniack*, for this salt having all its parts intirely united, cannot so well mix with the sulphur of spirit of wine; but if you add water enough to dissolve the salt, then there will be a *coagulum*, because the parts of the salt will be disunited, and by the help of water will enter into the pores of Spirit of wine. I have explicated this *coagulum* in the Remarks of the Chapter preceding.

The volatile *Sal Armoniack* does dissolve well with waterish liquors, and spirit of *Sal Armoniack* may be made of them together, by only mixing water enough to dissolve the salt. But if you would mix, or dissolve it in Spirit of wine, you will find a great deal of trouble in the doing it; if you should only infuse it in spirit of wine, it would none of it dissolve; on the contrary, that is a way to keep and preserve the salt; therefore you must distil it over several times, that the saline parts may rarefie, and unite with the spirit of wine. That which remains undissolved in the Receiver, has been very much rarefied by repeated distillations; for which reason it also dissolves some days afterwards.

Spirit of wine in this operation hath so wrought upon the volatile salts that they are no longer so disagreeable to the taste or the smell as they were before, and it is by that means that it sweetens them, for sulphurs do contemperate the acrimony of salts, as I have said speaking of the Principles.

Acid Spirit of Sal Armoniack.

This Spirit is a fixed *Sal Armoniack*, dissolved into a liquor with a great fire.

Take what quantity you please of the *fixt Ferbrifugous salt*, that I have spoken of; powder it, and mix it well with thrice as much Pottery-earth powdered: put this mixture into a Retort whose third part remains empty, place it in a close Reverberatory Furnace, and fit to it a large capacious Receiver. Lute the junctures close, and proceed in the method I spoke of, to make the *Spirit of Salt*, you'll find in the Receiver an acid spirit, which is a very good diuretick. It is esteemed to be specifick for Malignant diseases: the dose is to an agreeable acidity in Juleps and broths.

Remarks.

This acid Spirit proceeds from the fixt part of the *Sal Armoniack*, for the Alkali contributes not one drop of it.

Although the *Salt of Tartar* has weakned the strength of Sea-salt, which was mixed with the volatile salts in *Sal Armoniack*, as I have said, this same sea-salt nevertheless will yield a very acid spirit upon distillation, because the parts of sea-salt, though they have suffered a strong conflict with the other, yet do contain a Spirit as well as they do otherwise intire; after the same manner as when sea-salt is reduced into a very fine powder,

powder, it continues as full of Spirits, as when it was in larger pieces; for you must not imagine that *Sal Armoniack* does contain the acidity of sea-salt separate from its earth, for if it could remain in it in such a state, it would quietly divide the parts of the Alkali salt, with which it is mixed, and would be destroyed it self, but this salt remains in it in its substance intire.

C H A P. XVIII.

Of Vitriol.

Vitriol is a Mineral compounded of an *Acid Salt*, and *Sulphureous Earth*; there are four sorts of it, the *Blue*, the *White*, the *Green*, and the *Red*.

The *Blue* is found near the Mines of Copper, in *Hungary*, and the *Isle of Cyprus*, from whence it is brought to us in fair Crystals, which keep the name of the Country, and are called *Vitriol of Hungary*, or *Cyprus*; it partakes very much of the nature of Copper, which renders it a little Caustick; it is never used but in outward applications, such as *Collyriums*, or waters for the eyes, and to consume proud flesh.

White Vitriol is found near unto Fountains, it is the most of all depurated from a Metallick mixture: it may be taken inwardly to give a vomit; it is likewise used in *Collyriums*.

There

There are three sorts of *Green Vitriol*, the *German*, *English*, and the *Roman*. That of *Germany* draws near unto the *blue*, and contains a little *Copper*, it is better than the rest for the preparation of *Aqua fortis*. That of *England* partakes of *Iron*, and is proper to make the *Spirit of Vitriol*. The *Roman* is much like the *English Vitriol*, excepting that it is not so easie to dissolve.

Red Vitriol was brought among us a few years ago out of *Germany*, it is called *Natural Colcothar*, and is esteemed to be a *Green Vitriol Calcined* by some subterranean heat. It is the least common of them all, it stops *Bloud*, being applied to *Hemorrhagies*.

If you dissolve a little *white*, or *green Vitriol* in water, and write with the dissolution, the writing will not be seen, but if you rub the paper with a little *Cotton* dipt in the decoction of *Galls*, it will appear legible; then if you wet a little more *Cotton* in *Spirit of Vitriol*, and pass it gently over the paper, the *Ink* will disappear again; and yet at last if you rub the place with a little more *Cotton* dipt in *Oil of Tartar* made *per Deliquium*, it will again appear legible, but of a *Yellowish colour*.

The reason that I can give for these effects is this, the *Spirit of Vitriol* dissolves a certain *Coagulum* which is made of *Vitriol* and *Galls*, but the *Oil of Tartar* breaking the force of this acid Spirit, the *Coagulum* recovers it self, and appears again, but because it now contains *Oil of Tartar* too, it acquires a new colour.

If you throw the dissolution of *Vitriol*, or *Vitriol* only powdered, into a strong decoction of dried
Roses,

Roses, it will turn as black as common Ink; if you pour some drops of *spirit of Vitriol* into it, this Ink will turn red; and if you add to it a little volatile spirit of *Sal Armoniack*, it will turn gray.

These changes of colour do proceed from the *spirit of Vitriol's* dissolving the *Coagulum* which the *Vitriol* it self had made, and rendring it invisible; the liquor recovers a fresher red colour than it had, before the *Vitriol* was put into it, because the same spirit does separate the parts of the Rose which were dissolved in the liquor, and renders them more visible.

The volatile spirit of *Sal Armoniack*, which is an alkali, does partly break the acid edges of the *spirit of Vitriol*, so that the parts of the Rose having nothing more to keep them rarefied, do close together, and consequently the liquor changes colour.

By this experiment may be seen, that the dried Rose may serve to make Ink with, as well as Galls; *Indian wood*, and divers other things will do the same.

Gilla Vitrioli, or Vomitive Vitriol.

This operation is only a purification of white *Vitriol*.

Dissolve what quantity you please of white *Vitriol*, in as much *Phlegm of Vitriol*, as is needful to dissolve it; filtrate the dissolution, and evaporate two thirds of the moisture in an earthen pan. Put the rest into a cool place for three days time, there will shoot out Crystals, which you must separate;

rate; then evaporate a third part of the liquor that remains, and set the vessel again in a Cellar, there will shoot new Crystals; continue thus evaporating and crystallizing, until you have gotten all you can; dry these Crystals in the Sun, and keep them for use; the dose is from twelve grains to a drachm, in Broth, or some other liquor.

Remarks.

This is only a Purification of *Vitriol*, that serves to separate a little earth from it.

All the liquor may be evaporated without any Crystallization, the *Gilla Vitrioli* will remain at bottom in a white powder.

White Vitriol is used in this operation rather than *Green*, because it is milder.

The other *Vitriols* may be purified after the same manner.

After taking this vomit, a man sometimes voids by stool a black matter like Ink, because it frequently happens that some part of the *Vitriol* descending into the Guts, meets a saline matter that it joyns with, and so causes a blackness, as it uses to do when *Vitriol* is mixed with Galls.

Calcination of *Vitriol*.

Put what quantity you please of *Green Vitriol* into an earthen pot unglazed; set the pot over the fire, and the *Vitriol* will dissolve into water; boil it to the consumption of the moisture, or else
until

until the matter turn into a grayish mass drawing towards white; this is called *Vitriol Calcined* to whiteness. If you should Calcine this gray *Vitriol* a good while over a strong fire, it would turn as red as blood. It is called *Colcothar*, and is good to stop blood, being applied to a wound.

Remarks.

You must not Calcine the *Vitriol* in a glazed pot for fear of dissolving the Vernish, which would change the nature of the *Vitriol*.

It may be Calcined, or rather dried in the Sun, until it becomes white, this Calcination deserves to be preferr'd before the other, but only it is longer a doing.

The *Vitriol* may be likewise spread about a Furnace heated a little, and so dried until it turns white.

If you should resolve to dry as exactly as you can, sixteen pounds of green *Vitriol*, there would remain but seven pounds of white *Vitriol*.

But in order to do this, you must powder the white mass of Calcined *Vitriol*, after you have broke the pot, and stir it a long time in an earthen pan, over a little fire, until there rises no more fume from it, or until there remains in it no more phlegm.

If you should Calcine this white *Vitriol* to a redness, you'd have five pounds and a half of *Colcothar*. The sulphur of *Vitriol* is lost during this last Calcination, you must do it in the Chimney, for the fume would be very injurious to the breast.

This

This sulphur has the same smell as ordinary sulphur.

Some have writ, that the red colour which appears after a long Calcination of *English Vitriol*, was an undoubted proof that there was Copper in it, after the same manner as the red colour which happens to Verdigreese calcined is a certain proof that it contains in it some particles of Copper.

But that which is here said to pass for a thing undeniable, is no proof at all; for first of all those *Vitriols* which are thought most to partake of Copper, do give no greater redness in their Calcination, than the others which partake the least of it. Secondly let Copper be prepared which way you please, you can never make it redder than the *Colcothar* of *English Vitriol*, whose redness must be thought to proceed from some particles of this metal contained in it. And thirdly, we see plainly, that *Iron*, *Lead*, *Mercury*, and divers mineral bodies do acquire a red colour in their Calcining, without containing any Copper.

The *Sympathetical powder* that has made so much noise is nothing but white *Vitriol* opened, prepared divers ways according to mens different conceptions about it. The *Roman Vitriol* is better esteemed than the other for this operation.

The common method of preparing this *Powder* is to expose it to the heat of the Sun, whilst the Sun is in *Leo*, that is in *July*, in order to dry it, and to open it. And men think that Sign does bestow particular influences on the preparation. Though in truth it undergoes drying better in that season than another, by reason of the great heat then

then of the Sun. And it may be the parts of the *Vitriol* do become more volatile by this heat, but for what is said of Influence it is meerly imaginary.

Many do only pulverize the ordinary *Vitriol*, in order to make the Sympathetical powder.

When you would use this powder, you are to take the blood of a wound upon a linnen cloth, and to sprinkle some of it upon the blood. It is pretended, that though the bloody linnen were ten miles off from the Patient, when the Sympathetical powder is applied to it, the wound would presently heal. But the experience of several persons who have tried it (and others may do the same) does evince, that men have had a great faith, when they have talked of the effects of this powder; for if it be not applied to a cloth newly blooded, and even in the chamber of the Patient, you will certainly find no effect from it. Nay where such precautions have been used, it performs no great matter, and sometimes does nothing at all.

Now to explicate the action of *Vitriol*, called Sympathy, you must know that there does continually exhale into the air, little bodjes from this mineral salt, and to convince you of it, you need only to put the several *Vitriols* of different colours pretty near one another in the same place, you will find after 12 or 15 daies that they have all changed colour a little in their *superficies*. The white will become yellow, the green whitish, the blue greenish, the red grayish. These changes of colour cannot proceed but from little bodjes, which being separated from each kind of *Vitriol*,
and

and mixing in the air, some part of them do fall confusedly on the matter. And it must not be said that these changes are caused by the air, which does open and rarefie these salts; for if you put them into places separate, or distant from one another, this effect will in no wise happen.

You must also observe that the blood, to which the Vitriolick powder is applied, retaining some heat still, may thereby increase the activity and number of the little bodies which do arise from the *Vitriol*.

And these Vitriolick bodies dispersing themselves in the air are they that cause all the Sympathy, for they do mix in the wound of the patient, and because the virtue of *Vitriol* is to stop the blood, and to dry it, you need not wonder if the volatile parts which come from it, do perform the same effect.

But it may be objected, that the volatile parts of *Vitriol* have no more determination naturally to go find out the wound of a person, than other parts of the body, and other places of the chamber. Nay on the contrary, that a wound being commonly covered with a plaister, and somewhat thick bandage, is not so likely to receive those bodies.

I answer, that there is no need of giving any other determination to these volatile parts of *Vitriol*, than is given to other volatile salts which are dispersed in the air; but because wounds are always of a glutinous temper, it is easie to conceive that these little bodies will adhere to them in greater quantity than to others, as any downy substance which flies about a room, wherein there is Glue, or Turpentine, will

successful in one, will be found to fail in a great many others.

Many Authors have also written a great many falsehoods in defence of the Sympathy, as for example, that if the urine of an Infant were cast into the fire so soon as it is made, it would cause a heat of urine: that if the excrements of an animal were thrown into the fire, or among Nettles, there would be an Inflammation in the guts of the same creature, and many the like stories, which a thousand experiments will prove not to be true.

Distillation of Vitriol.

This Spirit is an acid salt of *Vitriol*, dissolved into a liquor, by a great fire.

Fill two thirds of a large earthen Retort, or glass one luted, with *Vitriol Calcined* to whiteness; place it in a close Reverberatory furnace, and sitting to it a great Balon or Receiver, give a very small fire to warm the Retort, and make the water come forth that might still remain in the *Vitriol*; and when there will distil no more, pour the water out of the Receiver into a Bottle, this is called *Phlegm of Vitriol*; it is used in Inflammations of the eyes to wash them with: refit the Receiver to the neck of the Retort, and luting the junctures exactly, encrease the fire by degrees, and when you perceive Clouds to come forth into the Receiver, continue it in the same condition, until the Receiver grows cold; then strengthen the fire with wood to an extream violence, until the flame rises through the Tunnel of the Reverberatory as

big

big as ones arm. The Receiver will fill again with white Clouds; continue the fire after this manner for three days, and so many nights, then put it out: unlute the junctures when the vessels are cold, and pour the Spirit into a glass body, set it in sand, and fit to it quickly a Head with its Receiver; lute the junctures close with a wet Bladder, and distil with a very gentle fire, about four ounces of it, this is the *Sulphureous spirit of Vitriol*, keep it in a viol well stoppt.

It is good for the *Asthma*, Palsie, and diseases of the Lungs, the dose is from four drops to ten in some convenient liquor.

Change the Receiver, and augmenting the fire, distil about half the liquor that remains in the body: this is called the *Acid Spirit of Vitriol*, it is mixed in Juleps to an agreeable acidity.

That which remains in the body is the most acid part of the *Vitriol*, and is improperly called *Oil*. It may be used like the *acid Spirit*, for continued Feavers, and other distempers that are accompanied with a violent heat. This Oil is likewise used for the dissolution of metals.

You'l find in the Retort a *Colcothar* which hath the same virtues with that I spoke of before.

Remarks.

To make the *Spirit of Vitriol* you must take *green English Vitriol*, such as being rubbed upon Iron doth not at all change colour, which shews it doth not partake of Copper, as the *German* does, that looks a little blueish, and is more acrimonious.

You must Calcine it as I have said, to the end it being deprived of the greatest part of its *Phlegm*, the distillation may be dispatched the sooner. A third part of the Retort is left empty, that the Spirits may have room to rarefie in, when they come forth.

There distils also a great deal of *Phlegm* into the Receiver, and all of it is known to have come, when there drops no more. Those who don't care for the *sulphureous spirit*, do let it come forth, and mix together with the *Phlegm*, before the junctures are luted; but you must be sure to govern the fire discreetly at that time; for these Spirits come with a great deal of violence, and use to break the Retort, when they are driven too furiously. When they are out, you must augment the fire to the last degree of all, for the acid Spirit will not part with its earth, until it is forced by an extraordinary heat.

If you distil eight pounds of *white Vitriol*, at sixteen ounces to the pound, you'l draw off seventeen ounces of *Phlegm*, and two and twenty ounces and a half, both of the *Sulphureous*, and the *Acid spirit of Vitriol*. Of these two and twenty ounces and a half, there will be five ounces of *Sulphureous spirit*.

You'l find in the Retort five pounds, five ounces of *Colcothar*.

Use all the care you can possible to preserve all the liquors which come from *Vitriol*, yet it will be impossible for you to hinder it from losing some through the junctures, during the distillation.

If you should use *German* instead of *English Vitriol*, you'd draw off a little more spirit than the quantity

quantity I have named, but it would have some smell of *Aqua fortis*, and the matter which remains in the Retort would be of a brown colour drawing towards black. This colour proceeds from sulphureous Fuliginosities which rise more from this *Vitriol* than the other, because it partakes of Copper; for this Sooty vapour finding no vent to get out at, falls down again upon the matter and blackens it.

The Furnace in which this operation is performed, must be very thick, that the heat of the fire being none of it lost through the Pores, may the better act upon the Retort. These Spirits do rarefie into white vapours in the Receiver, which must be provided large enough, to give them free liberty to circulate in, before they condense into a liquor at bottom. The fire is usually continued four or five days together, but if after that, you should change the Receiver, and continue the fire three or four days longer, there would come forth an *Oil of Vitriol* congealed, and caustick, which is nothing but the more fixt part of the *Spirit of Vitriol*. And this Congelation hath given this liquor the name of *Oil of Vitriol*, though improperly.

Vitriol contains earth enough, wherefore none is added to it, as is necessarily done in the distillation of *Niter*.

Acid Spirits are Salts become fluid by the force of fire, which hath disingaged them from their more terrestrious part, and they may be revived again by pouring them upon some Alkali; for example, the *Spirit of Vitriol* remaining some time upon *Iron*, doth reincorporate into *Vitriol*, and the *Spirit of Niter*, poured upon *Salt of Tartar* makes a *Salt-peter*.

There is one thing happens about the *Oil of Vitriol*, when it is very strong, which is strange indeed; it is, that if you mix it with its *Acid Spirit*, or with water, or else with an *Ethereal Oil*, such as the *Oil of Turpentine*, this mixture grows hot to that degree, that sometimes it breaks the *Viol* it was put into, and often it produces a considerable *Ebullition*.

I could quickly give an account of this heat and *Ebullition*, if I would suppose an *Alkali* to be in the *Oil of Vitriol*, as those do who pretend to explicate every thing that happens by the notions of acid and alkali; but not comprehending how an alkali should be able to remain so long a time with so strong an acid as is the *Oil of Vitriol* without being destroyed, I had rather give a reason that seems to me abundantly more probable.

I conceive therefore that if water, or *Spirit of Vitriol*, or the *Ethereal Oil of Turpentine* do come to heat the *Oil of Vitriol*, it is by setting in motion a great many fiery particles which the *Oil of Vitriol* had drawn with it in the distillation; for these little fiery bodies being environ'd with salts that are exceeding heavy, and hard to rarefie, they drive about with vehemence whatsoever stands in their way, and when they have caused an *Ebullition*, and find they can't get out at the top of the *Viol*, they break it to pieces with the bussle they make at bottom, and on the sides.

Perhaps it will be said, I do here suppose *gravis* that the *Oil of Vitriol* does contain fiery particles; but if we consider the great violence of fire, and the time that is spent in drawing this acid, it will be no such hard matter to grant me this supposition.

position. Besides it will be hard to explicate the great and burning Corrosion of Oil of *Vitriol* without admitting these fiery parts, for the *Vitriol* contains nothing in it self of this Caustick nature; it is true indeed that it contains *Phlegm*, *Sulphur*, and *Earth*, but it is a thing impossible but this acid should discover it self more than it does, if it were as Corrosive in the *Vitriol*, as it is in the Oil.

Once it hapned to me, that putting into my Furnace a Retort whose two thirds were filled with *German Vitriol* dried, in order to draw off its Spirits, I distilled first of all the *Phlegm*, and sulphureous spirit, which I took out of the Receiver; I then fitted it again to the Retort, and by a great fire continued three days and three nights, I distilled off the acid Spirit as we are used to do. When the vessels were cold, I admired to find in my Receiver nothing but a mass of Salt, or Congealed Oil of *Vitriol*. This Salt was so exceeding Caustick and burning, that if I offer'd to touch the smallest part of it with my finger, I presently felt an insufferable scalding, and was fain to put my hand immediately into water, it continued to fume still, and when a little of it was thrown into water, it made the same hissing noise, as a fire-coal flung into water would do. Besides it heated the water very much, and much more than common Oil of *Vitriol* could.

I kept this congealed Spirit about six months, after which time it dissolved into a liquor, which I used as Oil of *Vitriol*; for it was in effect the same thing.

And in my opinion this operation does sufficiently evince, that Oil of *Vitriol* contains fiery parts.

It hapned to me another time, that having rectified the Spirit of *Vitriol*, to separate it from its Oil by an Alembick, some part of the distilled Spirit was turned into fair and transparent Crystals in the bolt-head, or Receiver, which Crystals had the same acrimony, and strength with the mass I now spoke of.

If you pour some drops of Spirit, or Oil of *Vitriol* into a quart of hot water, in which you shall infuse a pugil of dried red Roses, the liquor will in a little time become as red as Claret; and this effect must not so much be attributed to the Spirit of *Vitriol*'s sharpening the water, and so thereby drawing out the Tincture of Roses, as to this that the acid Spirit does rarefie and separate the particles of the Rose (which the water had dissolved) and made to appear better than before; for if you strain the Infusion, and separate the Roses, before you pour to it your Spirit of *Vitriol*, although the liquor so strained be yet but little raised in colour, it will nevertheless turn to as high a red, after the Spirit is dropt into it, as if the Roses remained still in the liquor. We must say the same thing of other Tinctures that are drawn by acids, as also of such as are made by an Alkali salt.

If you fill a glass Viol with the decoction of *Nephritick wood* clarified, and look on it, turning toward the light, it will appear yellow; but if you turn your back to the light, it will appear blue; if you mix with it some drops of Spirit of *Vitriol*, it will appear yellow on every side, but if you again add about as much more Oil of *Tartar*, it will return unto its first colour.

If

If you take a Blue, or Violet tincture made in water, such as is drawn out of the Sun-flower, or Violet flowers, and pour upon it some drops of *Spirit of Vitriol*, it will presently turn red; but if you throw into it some Alkali salt, it will recover again its former colour.

On the contrary if you pour an Alkali liquor, such as volatile Spirit of *Sal Armoniack*, or the *Oil of Tartar*, upon the blue Tincture, it will presently turn green; and if you again pour upon it a little *Spirit of Vitriol*, it will change this colour into an obscure red.

The decoction of *Indian wood* is very red: if you drop into it a little *Spirit of Vitriol* it will turn yellow; and if you still add some volatile Spirit of *Sal Armoniack* it will become black.

If you infuse three or four hours a piece of *Indian wood* in some clear juice of Citron, and take out your wood, the liquor will have received no alteration of colour, but if you add to it some drops of *Oil of Tartar* made *per deliquium*, it will take a brown colour, and if you add to it a little *Spirit of Vitriol*, it will resume its colour again.

If you pour some drops of *Oil of Tartar* upon Claret, it will become greenish, and if you add to it a little *Spirit of Vitriol*, it will return to its former colour.

All these changes of colour, which the Spirit of Vitriol, or other acids, and Alkali's do make, proceed only from the different position of bodies dissolved in the liquor, and from its disposition to modify the light different ways.

Styptic

Styptick Water,

This water is a solution of Vitriol and other ingredients, to stop bleedings.

Take *Colcothar*, or the red Vitriol that remains in the Retort after the spirit is drawn out, *Burnt-alom*, and *Sugar-candy*, of each half a drachm, the Urine of a young person, and Rose-water, of each half an ounce, *Plantain-water* two ounces, stir them all together a good while in a mortar, then pour the mixture into a Viol, and when you use it, separate it by Inclination.

If you apply a Bolster dipt in this water to an opened Artery, and hold your hand a while upon it, it stops the blood. In like manner you may wet a little Pledget in it, and thrust it into the Nose, when an Hemorrhage continues too long; taken inwardly, it cures spitting of blood, bloody flux, and the immoderate flux of the Hemorrhoids, or Terms, the dose is from half a drachm to two drachms in Knot-grass water.

Remarks.

When the blood gushes forth too fast, you must redouble the first Bolster, that was put upon the wound, and assist it a little with your fingers for half an hour.

The Basis of this water is *Colcothar*.

Having used this water with good success upon several occasions, I was willing to insert it in this Book,

Book, and I believe if any body please to experiment it, as I have done, they will easily acknowledge it to be an excellent Remedy in many Distempers.

Lapis Medicamentosus.

Powder and mix together *Colcothar*, or the red Vitriol, that remains in the Retort after distillation, or in want of it Vitriol Calcined to a redness two ounces, *Litharge*, *Alom*, and *Bole-Armenick*, of each four ounces; put this mixture into a glazed pot, and pour upon it good Vinegar enough to cover the matter two fingers high; cover the pot and leave it two days in digestion, then add to it eight ounces of *Niter*, two ounces of *Sal Armoniack*; set the pot over the fire, and evaporate all the moisture, Calcine the mass that remains, about half an hour in a strong fire, and keep it for use. It is a good Remedy to stop *Gonorrhoeas*, a drachm of it is dissolved in eight ounces of Plantain water, or Smith's water, to make an Injection into the Yard; it is likewise good to cleanse the eyes in the small pox, seven or eight grains of it must be dissolved in four ounces of Plantain or eye-bright water; it is also good to stop blood, applied outwardly to a wound. It may be dissolved in Knot-grass water, and will go near to have the same effects as the *Slytrick water*.

Remarks.

Remarks.

This stone is called *Medicamentosus* by way of excellence, by reason of the good effects it produces.

The *Colcothar*, that remains in the Retort after the distillation of *Vitriol*, must be better than the others for this Operation; because being deprived of the greatest part of its Spirits, it is the more Astringent.

Litharge, which is a *Lead Calcined*, *Alom*, and *Bole-Armenick*, are so many considerable Astringents, that do no hurt in this composition.

Vinegar is put in to incorporate the ingredients together, and set them a Fermenting, after which the *Niter* and *Sal Armoniack* do easily mix among the rest.

The Calcination which is given to it at the end, is done to carry off some part of the acid, and to augment the Astringtion: It likewise fixes the stone the more, and makes it fitter to keep.

It is one of the best Remedies I ever met with, for stopping *Gonorrhœas*, when it is a proper time to stop them by Injections.

Salt of Vitriol.

This Operation is the more fixed *Salt of Vitriol*, that remains after distillation.

Take two or three pounds of the *Colcothar*, that remains in the Retort after distillation of *Vitriol*,
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let it infuse in eight or ten pints of warm water for ten or twelve hours; boil it a little while, and then let it settle; separate the water by Inclination, and pour new water upon the matter; proceed as before, and mixing your Impregnations, evaporate all the moisture in a sand-heat in a glass or earthen vessel, there will remain a salt at bottom.

It is used as the *Gilla Vitrioli*, to give a Vomit; the dose is from ten to thirty grains.

Remarks.

This salt is that part of the *Vitriol* that the fire is not able to rarefie into Spirit. Some Authors say, that it Vomits just after the same manner, as *Gilla Vitrioli*, taken in a smaller dose, but I have observed that its effect was much less, and on the contrary there was need of giving it in a larger dose than the *Gilla*, to procure a Vomit; for having given of it several times a drachm at a dose, the person had no Inclination at all to Vomit; and truly I am apt to believe that a fixt salt of Vitriol divested of its Sulphur, doth rather tend to precipitate downwards than mount upwards; for Vomiting is caused by Saline Sulphurs, which prick the Fibers of the Stomach, whence follows a Convulsion to this part.

That which remains indissoluble is called *Caput Mortuum*, it is used for Astringents.

If you expose it to the Air for a year, or a year and half, it returns into Vitriol again.

CH A P. XIX.

Of Roche-Alom, and of its Purification.

Roche-Alom is a very Styptick Mineral Salt, found in the veins of the earth in many places of *Europe*; it is taken up in great transparent pieces, the best is that which is reddish, for the white contains fewer Spirits.

Alom is purified after the same manner as *Vitriol*; it is used to cleanse the teeth; it is a good Diuretick; a drachm of it is dissolved in a quart of water, and a glass of it is given now and then.

Many things are likewise called by the name of *Alom*, as the *Saccharinum*, which resembles Sugar, it is nothing but a mixture of *Roche-Alom*, *Rose-water*, and the white of an Egg. *Plume-Alom*, which some call *Lapis Amianthus*, is a kind of Talk.

Distillation of Alom.

Put five pounds of *Roche-Alom* into a glass or earthen body, and fitting to it a head with its Receiver, distil in sand as much as will rise, you will have a *Phlegm of Alom* that is used for distempers of the eyes, for Quinsies, and to cleanse wounds: unlute the vessels, break the body, and powder the white mass that remains in it, put it into

into an earthen Retort half empty; place your Retort in a Reverberatory furnace, and fitting to it a large Receiver, lute the junctures close, and light a very small fire the first three hours only to warm the Retort, afterwards increase it every hour to the utmost violence, and these Spirits will come forth, and fill the Receiver with white Clouds; continue the fire in this condition three days together, then let the vessels cool: you'll find in the Receiver an acid Spirit, which you may rectifie by distilling it in a glass Alembick in sand, in order to make it the clearer. This acid is more disagreeable than that of Vitriol, it is used in Juleps for continued Feavers, and Tertian Agues; the dose is from four to eight drops; it is likewise good to cure the *Aphtha*, or little Chancres in the mouth.

Break the Retort, and you'll find in it a white mass very much rarefied, and light, it is called *Burnt Alom*, or *Calcined Alom*, it is used for to eat carnos excreescences, or proud flesh.

Remarks.

The Distillation of *Alom* must be performed like that of Vitriol, that is to say, without addition of earth, because these Salts do contain enough themselves.

The Body into which you put your *Alom* must be sure to be large enough, because it rarefies extremely.

The *Phlegm* is known to be all come forth, when there distils no more; for these Spirits being very weighty

weighty do require a greater heat than that of sand to raise them.

Some have written that *Alom* yields but very little acid, yet if they take the pains to keep a strong fire under it for three days together, they'll find that this Spirit does not give place in strength, or quantity to that of *Vitriol*.

Nor are we at all obliged to distinguish, as they would have us, the *Acrimonious*, *Corrosive* salt of *Alom* from its acid, seeing that there is nothing either *Acrimonious* or *Corrosive* in this Mineral salt, which will not turn into an acid Spirit, when it is strongly urged by fire.

If a Drachm of *Alom* be dissolved in six ounces of this *Phlegm*, you make an excellent *Alom water* to cleanse wounds and ulcers with.

The mass that remains in the *Cucurbite*, or *Dephlegmated Alom*, is more *Escarotick* than that which hath lost its Spirits.

Chirurgeons are wont to *Calcine Alom* in a *Frying pan*; but the Iron dulls the greatest part of its vertue, as absorbing its Spirits wherein consists the corrosion of *Alom*; the Retort must be filled but half full, because there happen *Ebullitions*, which do require room.

CHAP. XX.

Of Sulphur.

Sulphur is a kind of *Bitumen*, that is found in many places in *Italy* and *Spain*. There is brought among us both a *Natural* and an *Artificial*; the *Natural* is greyish, and called *Sulphur Vivum*, the other is Yellow, and is nothing but the *Natural* melted, purified from its grosser earth and formed into Rows, which we do commonly use.

Some think that *Sulphur* is a *Vitriol* sublimed in the earth, because these mixts are very often found near one another; that there is a great deal of *Sulphur* in the mass of Mineral *Vitriol*, and that the acid *Spirits* which are drawn from them both are wholly alike.

Flower of Sulphur.

This preparation is an exaltation of *Sulphur*.

Put about half a pound of *Sulphur* grossly powdered into a glass body, place it in a small open fire, and cover it with a pot or another *Cucurbite* turned upside down, one that is unglazed, so as that the neck of the one may enter into the neck of the other. Change the upper *Cucurbite* every half hour, sitting another in its place; add like-

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wise

wise new *Sulphur*; gather your *Flowers* which you find stuck in the Cucurbite, and continue to do thus, until you have got as much as you desire. Then put out the fire and let the vessels cool, there will remain at bottom only a little light insignificant earth.

The *Flower of Sulphur* is used in Diseases of the Lungs, and Breast, the dose is from ten to thirty grains in Lozenges, or in Electuary. It is used also in Unguents for the Itch.

Remarks.

This Operation is intended only to rarefie the *Sulphur*, that being become more open, it may work the better.

Sulphur is proper against Infirmities of the Lungs, when they proceed from a Viscosity that sticks to them, because it deterges; but if it should be given to such as are too much dried with a Feaver, it proves very ill in that it raises a greater motion of the humours: it cures Tettars, and the Itch, because opening the Pores it drives out the subtler part of the humor, but yet the grosser part remaining within, they do frequently return again.

You may use a glass head to fit upon the body.

If you mix one part of *Sal Polychrestum* with two pounds of *Sulphur*, and sublime them together, as those I have described, you'll have *white flowers of Sulphur*, which are thought to be better for distempers of the Breast than those others, they are given in the same dose. This whiteness proceeds

ceeds from a very exact attenuation which *Sal Polychrestum* gives to the *Sulphur*; the *Sal Polychrestum* which remains at bottom of the Cucurbite, may be Calcined, and if you afterwards Purifie it by solution, Evaporation, and Filtration, it will be as good as before.

Magistery of Sulphur.

This Operation is a *Sulphur* dissolved by an Alkali salt, and precipitated by an acid.

Take four ounces of the *Flower of Sulphur*, and twelve ounces of the *Salt of Tartar*, or *Saltpeter fixed* by the coals: put them into a large glazed pot, and pour upon them six or seven pints of water. Cover the pot, and setting it on the fire, make the matter boil five or six hours, or until being become red, the *Sulphur* is all dissolved. Then Filtrate the dissolution and pour upon it by little and little distilled Vinegar, or some other acid, there will presently appear a Milk, let it settle, that a white powder may precipitate to the bottom of the vessel; pour off by Inclination that which is clear, and washing this powder five or six times with water, dry it in the shade, this is called the *Magistery* or *Milk of Sulphur*; it is thought good for all diseases of the Lungs, or Breast; the dose is from six to sixteen grains in some convenient liquor.

Remarks.

Water alone is not able to dissolve such a gross body as *Sulphur*; wherefore an Alkali salt is added to divide it into small imperceptible particles.

The acid liquor pierces the Alkali, and by separating its parts makes it let go its hold, so that the *Sulphur* gathers it self together, and falls down to the bottom in a white powder. This powder is washed to take away the impression of the *Salt of Tartar*, and the acid that might remain among it, after which it may be said to be a *Flower of Sulphur Alcoholised*.

The change of its yellow colour into a white comes from this, that being more rarefied it hath a smoother surface then it had before, to reflect the light in a direct line to our eyes.

This Operation may give us an *Idea* of what happens in Chylification, and in Sanguification; for after the same manner as the *Sulphur* does become white, when it has been reduced into a *Magistery*, or fine powder, so the aliments having been fermented, and their substance attenuated in our stomachs, the Chyle receives a white colour; and after the manner as the *Sulphur* when intirely dissolved does turn of a red colour, so the parts of Chyle having been altogether exalted, and dissolved by repeated circulations, does become red and turn into blood.

This blood turns into a *Pur*, and becomes white in Imposthumes, because the acid which is found

in them having as it were fixed and gathered together its insensible parts, does make them recover again the colour of Chyle.

You must take care not to let there be any Silver vessel where this Operation is performed, because the vapour which proceeds from *Sulphur* will make it black.

Fifteen grains of this powder will do as much as double the quantity of *Flower of Sulphur*, for diseases of the Breast, and it doth not heat so much.

Balsom of Sulphur.

This Operation is a solution of the oily parts of common *Sulphur* in oil of Turpentine.

Put into a small matrafs an ounce and a half of *Flower of Sulphur*, and pour upon it eight ounces of *Oil of Turpentine*; place your matrafs in sand, and give it a digesting fire two hours; afterwards encrease it a little for four hours, and the Oil will take a red colour; let the vessel cool, then separate the clear *Balsom* from the *Sulphur* that could not dissolve. This *Balsom* is excellent for Ulcers of the Lungs and Breast; the dose is from one drop to six in some proper liquor.

This *Balsom* may be reduced to the consistence of an Unguent, by evaporating some part of it, and it is thus used to cleanse wounds and ulcers.

To make the *Aniseed Balsom of Sulphur*, you must use the Oil drawn from *Aniseed* instead of the *Oil of Turpentine*, and proceed as I have said; it is more agreeable than the former, and has less acrimony.

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Remarks.

Remarks.

There is no need of a great fire for this Operation, because *Sulphur* being a fat body doth easily incorporate with Oils, and commonly gives them a red colour. When you would have this *Balsom* taken in Potion, you must dissolve it in a little yelk of an Egg, that it may mix in waters, or broths.

That which remains undissolved in the matrafs is the acid or saline part of *Sulphur*, and is found crystallized.

A *Balsom* of *Sulphur* may be likewise made with Oil of Linseed, instead of the Oil of Turpentine, for wounds.

Spirit of Sulphur.

This Spirit is the acid part of *Sulphur*, turned into a liquor by fire.

Provide a great earthen pan, and set in the middle of it a little earthen pan turn'd upside down, and then another such pan on this filled with melted *Sulphur*; cover both these Pans with a great glass tunnel made on purpose, with a neck as long as that of a matrafs, and the bigness of a thumb; fire the *Sulphur*, and do not stop the hole of the tunnel, but let the air come in to increase its burning, for it would otherwise go out. When your *Sulphur* is spent, put new in its place, and continue to do so until you find under the lower pan as much Spirit as you need, keep it in a Viol.

It

It is put into Juleps to give them an agreeable acidity, to qualifie the heat of continued Feavers, and is a good diuretick. Some do prescribe it for diseases of the Breast, but because acids are apt to give a Cough, it may therefore do more hurt than good to that part.

Remarks.

A great many *Machines* have been invented to draw the *Spirit of Sulphur*; the ordinary one is the *glass bell*, under which the *Brimstone* is burnt, and the Spirits coagulating against its sides distil into an earthen pan, that is set underneath, after the same manner as I have shewed in the description of my *Machine*.

You must leave an empty space between the brims of the Bell, and the Pan, that the Fire may have air enough to keep it lighted; but besides that the Fire is apt to go out every moment, use never so much precaution, a very poor quantity of Spirit is drawn this way.

Authors do recommend this Operation to be done when the weather's wet, and to moisten the Bell before-hand, but I have found by experience that these circumstances signified nothing at all.

With the *Machine* that I have described I can draw a good handsom quantity of Spirit, and I am not forced to fire the *Sulphur* several times; because the hole at top gives vent to the air, and hinders the fires going out: Again the more Phlegmatick part evaporates that way, but the acid Spirit not being able to rise so high, condenses against

the sides of the tunnel, and then falls down under the little pan that is turned upside down, to raise the other higher, that contains the *Sulphur*. You may use a Crucible instead of a pan to put the *Sulphur* in.

The greenish *Sulphur* is better than the other for this Operation, because it has more Vitriol in it, and consequently more Spirit; for this Spirit is nothing but a *Vitriolick Salt* dissolved, that differs little from the *Spirit of Vitriol*, besides in the Taste, which is not so Empyreumatical, as not having undergone so violent a Fire.

The *Vitriolick salt* which is in the *Sulphur* does not rise, until the more volatile parts are spent; for which reason the Spirit does not distil until towards the end, and the drops begin then to appear in the middle of the Tunnel.

Forasmuch as *Sulphur* is good for diseases of the Lungs and Breast, many do think that the Spirit which is drawn from it ought to have the same virtues, but they do not consider that this Spirit being deprived of the fat, or most sulphureous part of *Sulphur*, hath also lost the virtue that accompanies it, and that it must produce effects altogether different from those of *Sulphur*, after the manner as the acid Spirits which are drawn from Sugar, Vitriol, and many other matters, have very different virtues from those of the mixts themselves. And the reason of it is very plain, for whereas the *Sulphur* by its ramous parts can sweeten the acrimonious humours which fall upon the Lungs, and so help the Cough, the *Spirit of Sulphur* which is an acid does prick the Fibres of the *Larynx*, and cause a Coughing, as all other acids do.

Salt

Salt of Sulphur.

The *Salt of Sulphur* is a *Sal Polychrestum* impregnated with *Spirit of Sulphur*.

Put four ounces of *Sal Polychrestum* prepared as I have said, into an earthen pan, or a glass vessel, and pour upon it two ounces of *Spirit of Sulphur*; set your vessel in sand, and evaporate all the liquor over a gentle fire: there will remain four ounces and six drachms of an acid salt, most agreeable to the taste, keep it in a bottle well stop'd.

It is a good medicine for to open all Obstructions, and to work by Urine, and sometimes it works also by stool; the dose is from ten grains to two scruples in broth. It is dissolved from half a drachm to two drachms in a quart of water for a drink in Feavers.

Remarks.

This *Salt* is improperly called *Salt of Sulphur*; for it is nothing but a *Sal Polychrestum* impregnated with an acid Spirit.

Many great descriptions have been given of *Salt of Sulphur*, which being well examined do all come to the same thing as this; it is called by many Authors a *Febrifugous salt*.

The true *Salt of Sulphur* (truly so called) should be a little of the fixed Vitriol which remains in the earth of *Sulphur*, after that the flowers have been drawn from it, and should be separated from the earth

earth by a *Lixivium*, as other fixed salts are made; but such a Salt would not have the same qualities as this.

Some have written, that when *Spirit of Sulphur* is poured upon *Sal Polychrestum* dissolved in water, there is made a great effervescency, as well as when the same Spirit is thrown upon *Salt-peter*: but without doubt they little examined the matter, for there is no ebullition made, neither with the *Sal Polychrestum*, nor with *Salt-peter*, they being both of them acid salts.

The union of acid Spirits with acid Salts is very different from that between acids and alkalis; for the acid Spirits not being able to open the insensible parts of acid Salts, they do lose nothing of their strength, and their keenness remains the same, but it is not so in respect of acids mixed with alkalis, for such a penetration is made into the alkalis that the acid loses its strength in them.

And for the reason that I have now given, the *Salt of Sulphur* is very acid, and *tartarum vitriolatum* is hardly at all acid, although there is employed proportionably as much more acid Spirit for the making *tartarum vitriolatum*, than there is for the making *Salt of Sulphur*.

The *Salt of Sulphur* is good in Tertians, and continued Feavers, and on all occasions where there is need of calming the too great motion of the humours, because the acid serves to fix the volatile Salts, or Sulphurs, which are most commonly the principal cause of these diseases.

CHAP. XXI.

Of *Succinum* or *Ambar*.

There is found in small currents near the Baltic Sea, in the Dutchy of *Prussia* a certain coagulated *Bitumen*, which, because it seems to be a juice of the earth is called *Succinum*, and *Carabè*, because it will attract straws; it is likewise called *Electrum*, *Glessum*, *Ambra Citrina*, vulgarly *Yellow Ambar*.

This *Bitumen* being soft and viscous, several little Animals, such as Flies, and Ants, do stick to it, and are buried in it.

Ambar is of different colours, such as *White*, *Yellow*, and *Black*. The *White* is most esteemed, though it be no better than the *Yellow*. The *Black* hath the least virtue of all.

Ambar serves to stop spitting of blood, the Bloody-flux, the immoderate flux of the Hemorrhoids, Terms, and Gonorrheas: the dose is from ten grains to half a drachm. It is likewise used to stop a little the violence of Catarrhs, by receiving the fume of it at the Nose.

Some do think that *Petroleum*, or Oil of Peter, is a liquor drawn from *Ambar*, by the means of Subterranean fires, which make a distillation of it, and that *Jet*, and coals are the remainders of this distillation.

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This opinion would have probability enough in it, if the places, from whence this sort of drogues does come, were not so far asunder the one from the other; for *Petroleum* is not commonly found but in *Italy*, in *Sicily*, and *Provence*. This Oil distils through the clefts of rocks, and it is very likely to be the Oil of some *Bitumen*, which the subterranean fires have raised.

Tincture of Ambar.

This Operation is a solution of some oily parts of *Ambar*, made in Spirit of wine.

Reduce into an impalpable powder five or six ounces of yellow *Ambar*, and put it into a bolt-head, pour upon it Spirit of wine to the height of four fingers, stop this bolt-head with another, to make a double vessel, and having exactly luted the junctures with a wet bladder, place it in digestion in hot sand, and leave it there five or six dayes, or until the Spirit of wine is sufficiently tinged with the *Ambar* colour; decant this Tincture, and put more Spirit of wine to the matter, you must digest it as before, then having separated the impregnation, mix it with the other: Filtrate them, and distil from them in an Alembick with a very little fire, about half the Spirit of wine, which may serve you as before; keep the Tincture that you will find at the bottom of the Alembick, in a Viol well stopd.

It is good for the Apoplexy, Palsie, Epilepsie, and for Hysterical women; the dose is from ten drops to a drachm in some proper liquor.

Remarks.

Remarks.

You must powder the *Ambar* finely, that the *menstruum* may open its body the better; this Tincture is nothing but the Sulphureous or oily part of *Ambar*, which Spirit of wine (a *Sulphur*) does become impregnated with: a liquor that were not sulphureous would perhaps dissolve the *Ambar*, but that which is dissolved by it would be the more impure; wherefore you must always use such a dissolvent as is of the same nature with the substance that you would dissolve.

Half the Spirit of wine is drawn off, to make the Tincture the stronger.

Distillation of Ambar, and the Rectification of its Oil, and Spirit.

Fill with *Ambar* grossly beaten two thirds of an earthen Retort, or glass one luted; place it in a Furnace, on two iron bars; fit to it a large Receiver, and luting the junctures close, give under it a small Fire to warm the Retort, and drive out the *Phlegm*. Afterwards augment it by little and little, there will come forth a Spirit, and an Oil; continue the Fire until there comes no more; then let the vessels cool, and unlute them. Pour about a pint of warm water into the Receiver, and stirring it soundly about, for to dissolve some volatile Salt that often sticks to the sides of the Receiver,

ceiver, pour all the liquor into a glass Alembeck; fit to it a Receiver, and luting well the junctures, make a small Fire to heat the vessel, then augment it a little, the water and Spirit will rise, and carry with them a little white Oil; continue the Fire, until there rises no more, and the thick Oil remains at bottom of the Cucurbite without boiling: separate the white Oil that swims above the Spirit and Phlegm, and keep it in a Viol well stoppt; it is given inwardly in Hysterical Distempers, in the Palsie, Apoplexy, and Epilepsie; the dose is from one drop to four in some appropriate liquor: it may be mixed with a little yelk of an Egg, to dissolve it easily in water or broth.

The water and Spirit do remain mixed confusedly together, now to separate them you must pour this mixture into an earthen or glass dish, and evaporate over a very gentle Fire two thirds of it; that which remains is the *Spirit of Ambar*, keep it in a Viol well stoppt.

It is an excellent Aperitive, and is given in the Jaundise, stoppage of Urine, Ulcers of the neck of the bladder, and in the Scurvy; the dose is from ten to four and twenty drops in some convenient liquor.

The *Black Oil* which remains in the Cucurbite may be kept apart for outward uses, to chafe the Nose and Wrists of women in Hysterical maladies.

If you would rectifie it, you must mix it with so much sand as is necessary to make it into a Paste, and put it into a Retort, and placing it in a Furnace in a naked Fire distil all the Oil; the first that comes forth will be red, but exceeding clear, keep it by it self; It may serve instead of the white.

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The Oil of Jet may be drawn as the Oil of Ambar, but because Jet is more terrestrious, it requires a stronger Fire.

Remarks.

The Oils of Ambar and Jet do work in Hysterical cases, chiefly by their ill smell; for we see that whatsoever is ungrateful to the smell does commonly allay symptoms in diseases of the *matrix*, and that good smells do increase them.

The reason of these effects is not very easie to find, seeing that all that has been hitherto said for explication of them has only come to this, that the *matrix* sympathizing with the brain does rise upwards to share in the good smells of the brain, and sinks downwards when the nose is offended with that which is unpleasant. Nay some have thought the *matrix* to be a little animal, by reason of the many motions that have been observed in it. These kinds of discourses are indeed very proper to leave people in the same doubts they were in before, and I don't think any body has received any satisfaction from them. Therefore let us try whether we can say any thing more to the purpose.

When a woman receives an agréable smell, the tickling pleasure which this smell produces in the brain by means of the olfactive nerve, does move the Spirits and determinate them to run into the vessels in a greater abundance, and with more agility than they did before. Then also is perceived, if she minds it, a certain titillation of the parts,
and

and all the senses do seem willing to partake of this good smell. All this is common to men as well as women.

But because the vessels which go from the brain to the *matrix* do swell with this affluence of Spirits, they must of necessity be abbreviated in their length, as a cord is found to swell and to shorten when it is wetted, or as the Fibres of a glove do shrink when the humidity that is within them is rarefied by the Fire.

These vessels being thus shortened, they must needs give shocks, and receive like returns from the *matrix*. And then likewise it is perceived to rise and to move upwards. But because this *viscus* does commonly contain a gross blood, and humors very easie to ferment, which are actuated by these shocks, there do rise from it gross vapours which oppress the diaphragm, and do cause that which is called the *suffocation* of the *matrix*. These distempers do likewise very often happen to women who have no ways been offended with sweet smells, but that which causes the same symptoms does work after the same manner.

As for ill smells, they must produce a quite contrary effect, for by striking offensively the nerve of the nose, the Spirits do retire back to their places, and consequently the vessels, and the *matrix* do resume their ordinary disposition.

But you will say perhaps that a grain of Musk or Civet is often applyed to the Navil, to settle the mother, and to lay the vapours.

This has been practised indeed by some, but without any proof that ever it did any good, or that it gave any ease. Civet is put into the middle
of

of *Galbanum* Plaisters, or the *Oxycroceum*, which is applied to the Navil, but there is more reason to attribute the effects which come from this remedy rather to the Plaisters than to the Civet. And besides, it cannot be said that this Civet, or this Musk thus applied do yield any good smell.

Many men are likewise very subject to vapours, and among others those that are of a Melancholick temper do seem to feel the same symptoms as women, upon any sweet smells. This comes from obstructions in the vessels, which have communication with the brain, for these humors which do cause the obstruction being thereby moved may produce these effects.

That which is called *Spirit of Ambar* is only a volatile salt dissolved in a little Phlegm.

Some Authors pretend, that putting this *Spirit* into a matraass with its blind-head, they can sublime a volatile salt from it as from Animals, but I could never find experience answer their pretences; for after having followed them several times in this Operation, I could never gain one jot of that salt, which hath given me occasion to examine this Spirit, and to enquire what kind of salt it might contain.

I found this Salt was acid, and like unto that of Plants which is called Essential, whereof I have spoken in the Principles. This Salt being less volatile than that of Animals, cannot rise so high, besides that it is heavier than the Phlegm which must rise first. Wherefore to separate it, you must evaporate about a third part of the Spirit, over a very gentle fire, and then put the remainder into a cool place, and leave it there ten or

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twelve

twelve days without stirring it, you'll find little Cryftals which you may take and keep in a Viol well ftopt. This Salt hath the fame virtues as the Spirit: the dofe is from eight grains to sixteen, in Raddish, or Pellitory water; but it is better to keep it in the Spirit, for befides that it is more eafily preferved fo, there always flies away some part of it with the Phlegm in the evaporation, let the fire be never fo moderate. But now I fhall give you a preparation of the volatile falt of *Ambar*, that may be eafily made, and may keep dry.

The Volatile Salt of Ambar.

Put two pounds of *Ambar* powdered into a large glafs or earthen Cucurbite, let it be filled but the fourth part, fet this Cucurbite in fand, and after you have fitted a head to it, and a fmall Receiver, lute well the junctures, and light a little fire under it for about an hour; then when the Cucurbite is grown hot, encrease the fire by little and little to the third degree; and there will diftil firft of all a phlegm and Spirit, then the volatile falt will rife, and ftick to the head in little Cryftals; afterwards there diftils an Oil firft white and then red, but clear: when you fee the vapours rife no longer, you muft put out the fire, and when the vefels are cold unlute them. Gather the volatile falt with a Feather, and becaufe it will be but impure as yet, by reafon of a little Oil that is mixed with it, you muft put it into a Viol big enough that the falt may fill only the fourth part of it, place the Viol in fand, after you have ftopt it only with
paper,

paper, and by means of a little fire, you'll sublime the pure salt in fair Crystals to the top of the Viol. When you perceive the Oil begin to rise, you must then take your Viol off the fire, and letting it cool, break it, to separate the salt; keep it in a Viol well stoppt, you'll have half an ounce.

This salt is a very good aperitive, and may be given from eight grains to sixteen in some opening liquor, for the *Jaundies*, for *Ischuries*, *Ulcers in the Bladder*, the *Scurvy*, *Fits of the Mother*, and upon all occasions where there is any need of removing obstructions, and opening by way of Urine.

The Spirit and Oil have the same virtues as those I have spoken of. If you would distil in a Retort the mass which remains in the Cucurbite, until there comes away nothing more, you'll have a Black Oil, which might serve women to smell to in fits.

Remarks.

The Cucurbite must be sure to be large enough, for otherwise it will break while the vapours are a rising.

You will have five ounces and a half of a clear Oil, and one ounce and a half of Spirit, two ounces and a half of a black oil, are drawn from the mass by the Retort, and that which remains weighs two ounces; it is a black rarefied matter which burns like coals by reason of the fuliginosities that fall upon it.

A clear Oil may be drawn from *Ambar* in the first distillation by mixing the *Ambar* with an

equal weight of sea-salt, and distilling it in a Retort the usual way; there will remain likewise some volatile salt in the neck of the Retort, which may be rectified by subliming it in a Viol as I have said.

CHAP. XXII.

Of Ambar-Grease.

A *Mbar-Grease* is a *Bitumen* found in many places on the Sea-shore, but especially in the *Indies*; it grows hard in the Sun-beams. The best is that which is very gray, and dry, and easily softens in the heat; when it is wet, it appears blackish.

Men have thought it is found no where else but in the *Oriental* seas, though some of it has been known to be sometimes met with upon the *English* Coast, and in several other places of *Europe*; most of it is brought from the Coast of *Melinda*, and especially at the mouth of the River that is called *Rio di Sena*.

Ambar-grease is an excellent Corroborative, it is given in some liquor, or in Electuary to increase Seed: the dose is from one grain to four.

Essence

Essence of Ambar-Grease.

This operation is an extract of the more oily parts of *Ambar-grease*, *Musk*, and *Civet*, in Spirit of wine.

Take two drachms of good *Ambar-grease*, so much *Sugar Candy*, half a drachm of *Musk*, and two grains of *Civet*; beat them small together, and put the mixture into a Viol: pour upon it four ounces of *Spirit of Wine* well *Alcoholized*. Stop the Viol close, and set it in Digestion in horse-dung four days; then taking it out, separate that which is clear, while it is warm, for it will congeal when cold. This *Essence* works more strongly than *Ambar-grease* in substance; the dose is from six to twelve drops in some convenient liquor.

Remarks.

Ambar-grease alone hath scarce any smell at all, but when its parts are put in motion by Fermentation, Sulphurs do rise from it which tickle the sense of smelling with a great deal of pleasure; the addition of *Musk* and *Civet* have a good effect; as for the *Sugar Candy*, it serves only to separate the rest, that they may be the more easily powdered and dissolved: for this Tincture is only a dissolution of these sulphureous matters in Spirit of wine.

The terrestrious part which remains at bottom may be used in sweet Powders.

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T H E
SECOND PART.
Of Vegetables.

C H A P. I.

Of Jalap.

J*Alap* is a grayish root brought out of *America*, cut into slices and dried; it grows in the Province of *Mechoacan*, and in several other places; the best is that which is most compact, and filled with Resinous veins. It purges watery humors very well, and is therefore usually given in the Dropsie and Gout: the dose is from ten grains to a drachm in broth, or White-wine.

Rosine, or Magistery of Jalap.

This Operation is a solution of the oily or resinous part of *Jalap*, made in Spirit of wine, and precipitated by common water.

Put a pound of good *Jalap* grossly powdered into a large matrafs; pour upon it Spirit of wine *Alcoholized*,
B b 4

bolized, until it be four fingers above the matter: stop the matrafs with another whose neck enters into it, and luting the junctures with a wet bladder, digest it three days in a sand-heat, the Spirit of wine will receive a red Tincture: decant it, and then pour more upon the *Jalap*; proceed as before, and mixing your dissolutions filtrate them through brown paper. Put that which you have filtered into a glass Cucurbite, and distil in a vaporous bath two thirds of the Spirit of wine, which may serve you another time for the same Operation. Pour that which remains at the bottom of the Cucurbite into a large earthen Pan, filled with water, and it will turn into a milk, which you must leave a day to settle, and then separate the water by Inclination, you'll find the *Rosine* at bottom like unto Turpentine. Wash it several times with water, and dry it in the Sun, it will grow hard like common *Rosine*; powder it fine, and it will become white. Keep it in a Viol, it purges Serosities. It is given in Dropsies, and for all Obstructions: the dose is from four to twelve grains, mixt in Electuary, or else in Pills.

The *Rosines* of *Turbit*, *Scammony*, and *Benjamin*, may be drawn after the same manner.

Remarks.

The Spirit of wine, which is a Sulphur, is likewise a very convenient *Menstruum* to extract *Rosines*, which are gross Sulphurs; you must use enough Spirit to dissolve all the *Rosine*, and give it a sufficient time to open all the body of the *Jalap*, after

after which a good part of the Spirit of wine is drawn off, and may serve for the same use again, provided you distil it with a very gentle fire, for if you let it be too strong, it will carry along with it good part of the *Rosine*.

A great deal of water is poured upon it, to weaken the Spirit of wine, which held the *Rosine* dissolved; and then it revives again, and its parts approaching one another, there is made a kind of milk, which clears up, according as the *Rosine* precipitates.

If you have used sixteen ounces of *Falap*, you will draw an ounce and six drachms of *Rosine* well washed and dried.

From six ounces of good *Scammony*, you draw five ounces of *Rosine* by the like preparation.

Some do evaporate the Spirit of wine, and without using any Precipitation, they find their *Rosine* in an Extract at the bottom of the vessel, but then it becomes black like pitch.

All the Purgative virtue of the *Falap* consists in the *Rosine*: an Alkali salt may be drawn from the remainder but in a very small quantity.

You must observe to give the *Rosine of Falap* always mixt with something else that may separate its parts for if it be taken alone, it will be apt to adhere to the inward membrane of the Intestines, and so cause Ulcers by its acrimonious quality.

Moreover *Apothecaries* should observe to mix it in a little yolk of an Egg, when they would dissolve it in a Potion, for it sticks to the mortar like Turpentine, when it is humected by any aqueous liquor. It may be likewise incorporated with some Electuary, and then it easily dissolves.

Twelve

Twelve grains of this *Rosine* work the same effect, as a drachm of *Talap* in substance.

It is not yet sufficiently known wherein the Purgative virtue of mixts doth consist, to give it a right explication. It is easily conceived that these effects do follow the Fermentation that the Remedy hath caused, but no body can find what it is that makes this Remedy be Purgative rather than several others, which seem to have as great a disposition as this to cause such Fermentation; wherefore I shall not pretend to clear the knowledge of this *Phenomenon*. I shall only endeavour to give some reason for a very considerable difficulty, which is to know how *Hydragogues* do work in our bodies, and why they rather purge water than other humors.

A general reason that may be given of it is that all *Hydragogue Remedies* have more acrimony than other Purgatives, and consequently they are better able to open the Lymphatick vessels.

But it may be further said that these Remedies do so cut and attenuate the Viscosities which are found in bodies, that they make them be like water, and there is no difficulty in conceiving this last reason, when it is considered, that these Remedies which do purge water, are all of them Resinous or else salts; for after the same manner as we see Sulphurs, or Liquified salts dissolve Sulphureous bodies, so do Rosines, which are Sulphurs and salts, dissolve Viscosities in the body, which are compounded of a great deal of Sulphur.

But there is this difference between the effects of *Salt* and of *Rosines*, that the Salt passing quick, and making but little impression, doth dissolve
only

only that which is found in what is called the first Region of the body, wherefore it purges but mildly; whereas the *Rosine* by reason of its viscous, hooked parts, remains a longer time in the body, and leasurely causes a Fermentation not only about the parts where it immediately works, but operates on the brain, and other remote places, from whence it forces Phlegm to discharge it self into the Belly, and this is that which causes Rosinous Hydragogues to purge more than Salts.

CH A P. II.

Of Rhubarb.

Rhubarb is a Purgative root, brought from China. It takes its name from *Barbary* where it hath grown in abundance; it is likewise called *Rheum*. The best sort is that which being broke appears of a Nutmeg colour within.

Its virtues are so many and so great, that if they were sufficiently known, and men could generally use it without that nauseousness which too commonly attends it, mankind would have infinitely less need, than they have, of the Art of Physick in most cases, and men might perhaps preserve themselves from most diseases without any other help.

Extract

Extract of Rhubarb.

This *Extract* is a separation of the purer parts of *Rhubarb*, from the terrestrious.

Bruise six or eight ounces of good *Rhubarb*, and steep it twelve hours warm in a sufficient quantity of *Succory* water, so as the water may be four fingers above the *Rhubarb*; let it just boil, and pass the liquor through a cloth; infuse the remainder in so much more *Succory* water, as before, then strain the Infusion, and express it strongly: mix your Impregnations, or Tinctures, and let them settle; filtrate them, and evaporate the liquor in a glass vessel, over a very gentle fire, until there remains a matter that hath the consistence of thick honey, this is called *Extract of Rhubarb*, keep it in a Pot.

The dose is from ten grains to two Scruples in Pills, or dissolved in *Succory* water for diseases of the Liver and Spleen, it binds after the purging.

The *Extracts of Vegetables* are made after the same manner, except the Resinous, whereof I have spoken. Likewise waters may be used for *Menstruums*, that are appropriated to the virtue of the mixt, whose *Extract* you intend to draw.

When you draw the *Extract of Aromatics*, such as *Roses*, and *Cinnamon*, the liquor may be distilled rather than evaporated, whereby you gain a fragrant water.

Remarks.

Remarks.

Though the name of *Extract* ought to be very general in Physick, it is confined only to one sort of Preparation that is reduced to the consistence of an Electuary, it is nothing else but a Purification that is made to cleanse a mixt from its more Terrestrial parts, that being more open and free it may work with the greater strength. Now this operation is good for mixts that are not Odoriferous, but not so for those that are; for by evaporation their best part is lost which consists in a volatile. So that I would by no means advise to make the *Extract* of *Aromatics*. Nature is a very good Artist to perform this Operation within our bodies, when the Principles are easie to separate, as in these sorts of mixts.

There has been a great contest among Chymists heretofore, in which of the Principles it is that the Purgative virtue of many medicins doth consist. Some have maintained it to be in the Salt, others in the Sulphur, and others again in the Mercury. But when every party had very diligently separated each their Principle, and came to try it, they found after all, that none of them was Purgative; which hath perswaded many of them to think that this Purgative principle was of so subtle and penetrating a nature, that glass it self was not able to preserve it from being lost.

For my part I cannot grant any such indiscernable Purgative, & I rather am apt to believe that the Purgative virtue of a mixt consists in nothing else but
such

such a different mixture of Principles as is requisite to produce certain Fermentations in our bodies. So that when once we separate the Sulphur, Mercury, or Salt, the position of parts, or proportion of Principles being changed, there remains no longer any Purgative effect, because the Principles being separated can no more produce that Fermentation which they did while they were mixed, and united together some kind of way that Art is ignorant how to imitate.

Perhaps some who think themselves good Critics will say this Chapter contradicts the former; for I there maintained that the Rosine of Jalap, which is a Sulphur, doth contain all the Purgative virtue of Jalap; but though I did call the Rosine of Jalap a Sulphur, I did not mean it was a pure Sulphur, it is a substance out of which all the five Principles may be still drawn; but by reason it doth contain great store of Sulphur, this name may be given to it as it often is to others of the like nature.

And thus *Salt* may be said to be Purgative too; but it doth not follow from thence that the Salt alone must be thought to contain all the Purgative virtue of mixt bodies; seeing many plants, such as *Guaiacum*, *Box*, *Carduus*, and *Wormwood*, do contain as much, or more Salt, than *Senna*, and *Rhubarb*, and yet nevertheless do not purge at all.

CHAP. III.

Of the Wood Guaiacum.

Guaiacum called *Lignum Sanctum* is the Wood of a large Tree that grows in a great many places in the *West Indies*. It is likewise cultivated here in *Europe*, in *Languedoc* is good store, but that which is brought out of the hot Countries is best esteemed; this Wood is very much in use in Sudorifick Decoctions; the *Bark* is also used, and the *Gum* that runs from it: the best *Guaiacum* is that which is most compact.

Distillation of Guaiacum.

This operation is a separation of the liquid parts of *Guaiacum*, from its terrestrious matter.

Take the shavings of *Guaiacum*, fill a large Retort with them three quarters full, place it in a Reverberatory Furnace, and joyn to it a great capacious Receiver. Begin the distillation with a fire of the first degree, to warm the Retort gently, and to distil the water, which is called Phlegm; continue it in this condition, until there come no more drops, which is a sign that all the Phlegm is distilled. Throw away that which you find in the Receiver, and fitting it again to the neck of the Retort, lute well the junctures. You must afterwards

wards encrease the fire by degrees, and the Spirits, and Oyl will come forth in white clouds; continue the fire until there comes no more, let the vessels cool, and unlute them, pour that which is in the Receiver into a Tunnel lined with brown paper, set upon a bottle, or some other vessel, the Spirit will pass through, and leave the black, thick, and very fetid Oil, in the Tunnel; pour it into a viol, and keep it for use; it is an excellent Remedy for rottenness of bones, for the Tooth-ach, and to cleanse old Ulcers. It may be rectified as I said of the Oil of *Ambar*, and may be used inwardly in the Epilepsie, Palsie, and to drive forth the after-birth: the dose is from two drops to six.

The Spirit of *Guaiacum* may be rectified by distilling it by an Alembick, for to separate a little impurity that might have passed with it; it works by perspiration, and by Urine: the dose is from half a drachm to a drachm and a half. It is likewise used mixt with the water of honey, to cleanse inveterate Ulcers.

You'll find in the Retort the coals of *Guaiacum*, which you may turn into ashes by putting fire to them, which they will sooner take than other coals: Calcine these ashes some hours in a Potters furnace, then make a *Lixivium* of them with water, which being filtred, evaporate it in a glass or earthen vessel in sand; there will remain the Salt of *Guaiacum*, which you may make white by Calcining it in a Crucible in a strong fire. This Salt is Aperitive, and Sudorifick; it may serve as all other Alkalis to draw the Tincture of Vegetables: the dose is from ten grains to half a drachm in some convenient liquor.

The

The earth, called *Caput Mortuum*, is good for nothing.

After this manner the five substances of all Vegetables may be drawn; but because the fire doth give them a loathsome Empyreumatical smell, other ways have been invented to draw the Oil of Aromatics: I shall describe them in the sequel.

Remarks:

During the distillation of Spirits, you must not make the fire too strong, for they coming forth with a great deal of violence, would else be apt to break either the Retort or the Receiver.

Though the *Guaiacum* that is used be a very dry body, yet abundance of liquor is drawn from it; for if you put into the Retort four pounds of this Wood, at sixteen ounces to the pound, you'll draw nine and thirty ounces of Spirit and Phlegm, and five ounces and a half of Oil; there will remain in the Retort nineteen ounces of coals, from which you may draw half an ounce or six drachms of an Alkali salt.

The Oil of *Guaiacum* is acrimonious by reason of the Salts it has carried along with it; and it is the gravity of these salts that does precipitate it to the bottom of the water. The Oil of Box, and most others that are drawn this same way, do the like.

These sorts of Oil are good for the Tooth-ach, because they stop the nerve with their ramous parts, hindring thereby the air from entering. Moreover by means of the acrimonious salts which they contain they do dissipate a phlegm which uses

to get within the gum, and causes the pain, but yet by reason of their fetid smell men have much ado to take them into their mouth.

That which is called Spirit of *Guaiacum* is nothing but a dissolution of the Essential salt of the Plant in a little phlegm.

The fixt salt is an Alkali that works much like others of that kind, nevertheless it is very probable that the fixt salts of Vegetables, let them be never so much Calcined, do always retain some particular virtue of the Plant they were drawn from.

If one would take the pains to Calcine the earth that remains, he would obtain a salt, though but very little of it.

CHAP. IV.

Of Paper.

THE *Papyrus* of the Antients, which gave the name to our PAPER, was a tree growing in *Egypt* near the river *Nilus*. The bark of this tree was prepared, and men did write upon it, but our Paper is made of old rags or clouts, which are beaten exceeding fine in Paper-mills, and then put into the prels in order to make Paper with them.

This Paper has some use in Physick; pieces of it are lighted in a room, and Hysterical women are made

made to receive the fume of it ; they are commonly relieved with this disagreeable smell, as by many others of the like nature.

Oil and Spirit of Paper.

Fold white paper into little pellets and fill a great earthen Retort, or glass one luted, with them, place your Retort in a Reverberatory furnace. Fit to it a large capacious Receiver, lute well the junctures, give it a very little fire for two hours only to heat the Retort ; increase it with two or three coals, and continue it so for two or three hours, then quicken it to the third degree. The Receiver will be filled with white clouds, put out the fire, when no more will come forth, the operation will be ended in seven or eight hours. When the vessels are cold, unlute them, pour what you find in the Receiver into a Tunnel lined with a coffin of brown paper, the Spirit will pass through the filter, and a thick, black, and ill-scented oil will remain within it, keep the oil for use in a Viol.

It is a very good remedy in deafness, some drops of it are put into the ear with a little cotton, from time to time, it quiets the noise of the ear ; it is also good for Tettars and for the Itch, the parts being anointed a little with it ; it cures the tooth-ach, much like the Oil of *Guaiacum* ; it is good likewise to repress hysterical vapours, women so affected are to smell to it.

You must rectifie the Spirit, by distilling it in sand. It is an Aperitive, and may be given where

there is occasion for a diuretick, the dose is from six drops to twenty in some proper liquor.

Remarks.

The Vitriol and other drogues which are in Ink might alter the virtue of the Oil and Spirit of paper; wherefore it is better to use clean, than written paper. The receiver must be large, in order to give room to the vapours to circulate in, for they come forth with that force that they would break the vessel if they had not room enough to play in; you must manage the fire with prudence, for if you make it too great the first hours, the Spirits will break the Retort.

If you have used in this operation four and twenty ounces of paper, you will draw two ounces and two drachins of Oil, and thirteen ounces and a half of Spirit, there will remain in the Retort seven ounces and a half of coals.

The Oil does not pass with the Spirit, through the coffin in the tunnel, because it is too thick, its black colour, and its ill smell, do come from the fire.

It is good for deafness, because that disease is often caused by a thick or phlegmatick humor which dries and hardens in the ear so as to stop the auditory nerve. Now this Oil dissolves and rarefies this humor, and disposes it the better to come out. And this is the reason that it dissipates the noises in the ears, for they were caused by winds which this humor had shut in.

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The Spirit is very acid in comparifon with other Spirits of Vegetables, becaufe it comes from an eſſential falt which has been put into a very conſiderable motion. Again, it is probable that by the many different forms which the flax, and canvas have received, in order to make cloth, and afterwards Paper, and by the fermentations which they may have received, their fixed falt may be volatilized, and become of the nature of that which is called Eſſential. Now in the diſtillation all this falt has been diſſolved into a liquor by the phlegm, and turned into that which is called Spirit; that which confirms me in this ſentiment is that there can be hardly any fixed falt at all drawn from the coal which remains in the Retort, wherefore the coal is thrown away as uſeleſs, it takes fire exceeding eaſily, by reaſon of a light foot that is fallen upon it, and which gave it the black colour.

CHAP. V.

Of Cinnamon.

C*innamon* is the Bark of a Tree as large as an Olive Tree, it grows in the *East-Indies*, and is much like that which the *Cassia Lignea* is taken from, but it is not the very ſame, as ſome will needs think; the beſt *Cinnamon* is that which has the ſtrongest ſmell, is quick upon the taſte, and of a reddiſh colour.

The *Cassia Lignea* differs from *Cinnamon*, in that it is not so biting to the taste, smells not so strong, and becomes mucilaginous in the mouth when it is chewed, which *Cinnamon* doth not do.

Both *Cinnamon*, and *Cassia Lignea* are good to fortifie the stomach, to help perspiration of gross humors, to strengthen and rejoice the heart, and in hysterical cases.

Oil, or Essence of Cinnamon, and its Aetherial water.

Bruise four pounds of good *Cinnamon*, and infuse it in six quarts of hot water, leave it in digestion in an earthen vessel well stopt two days: pour the Infusion into a large Copper Limbeck, and fitting a Receiver to it, and luting close the junctures with a wet bladder, distil with a pretty good fire three or four pints of the liquor, then unlute the Limbeck, and pour into it by Inclination the distilled water, you'll find at bottom a little oil which you must pour into a Viol, and stop it close. Distil the liquor as before, then returning the water into the Limbeck, take the Oil you find at bottom of the Receiver, and mix it with the first: Repeat this Cohobation until there rises no more Oil; then take away the fire, and distil the water that remains in the Receiver, the same way I shall shew hereafter to rectifie Spirit of wine, you'll have an excellent spirituous *Cinnamon* water.

The

The Oil of Cinnamon is an admirable Corroborative; it strengthens the stomach, and assists nature in her evacuations. It is given to make women have an easie delivery, and to bring their Terms; it likewise encreases Seed; a drop of it is commonly mixed in a little Sugar-Candy to make the *Eleo-saccharum*, which is easily dissolved in Cordial, or Hysterical waters.

The spirituous water of Cinnamon hath the same virtues, but two or three drachms are requisite for a dose.

After this manner almost all the Oils of Odoriferous Vegetables may be drawn, such as those of Box, Roses, Rosemary, Lavender, Juniper, Cloves, and Anis-feed, which do either swim above the water, or fall to the bottom, according as they are more or less loaded with Salts.

Remarks.

You must make the fire strong enough, for if there be not a sufficient heat, the Oil will not rise.

The Cohobation serves to open the Body the more, that the Oil may compleat its separation.

Cinnamon yields less Oil than other woods, or Barks, and it is very difficult to draw six drachms of it out of four pounds, let it be never so good.

The Spirituous water of *Cinnamon* is nothing but a rarefied Oil, whose parts are separated in the water by Fermentation, so as they become imperceptible: they do make what is called a volatile Spirit, which easily mixes with all sorts of liquors, as doth the *Eleo-saccharum*; for the *Eleo-saccha-*

um is properly an Oil, whose parts being separated in the Sugar, do easily mix in waters.

Tincture of Cinnamon.

This operation is an exaltation of the more oily parts of *Cinnamon* in Spirit of wine.

Take what quantity of bruised *Cinnamon* you please, put it into a Matrafs, and pour upon it Spirit of wine one finger above it; stop your matrafs close, and set it in Digestion in horse-dung four or five days, the Spirit of wine will be impregnated with the *Tincture of Cinnamon*, and become red; separate it from the *Cinnamon*, and after it is filtrated, keep this *Tincture* in a viol well stoppt; it is an admirable Cardiack, it fortifies the stomach, and rejoices all the vital parts: it may be used like *Cinnamon* water, in a little smaller dose.

After this manner the *Tincture* of all Odoriferous Vegetables may be drawn.

C H A P. VI.

Of the Bark of Peru.

THE *Peruvian Bark*, called *Quinquina*, or *Kina Kina* by the *French*, is a Bark that has been brought into these parts, some years since, from *Peru*; it retains the name of the Tree from which it is taken, the *Spaniards* do call it *Palo de Calenturas*, or the wood against Feavers. There are two kinds of this Tree, the one is cultivated, and the other grows wild, the cultivated is much better than the other; you must choose it of a compact substance, bitter to the taste, and of a reddish colour.

It is the most certain remedy that ever yet was known, to hinder the fits of Agues. The manner of using it for a great while past has been to give the patient the powder from half a drachm to two drachms, with a little white-wine, at the coming of the fit. But this method has been quite changed in our days, for at present we do infuse an ounce of the powder in two quarts of wine, eight and forty hours, in a *Balneum*; the infusion is then strained, and the patient is made to drink every day three or four little glasses of it, at some distance from the Paroxysm. The use of this remedy is continued a fortnight at least.

Some do frequently add to the infusion of this Bark, the lesser Centaury, Wormwood, Chervil, Juniper-

Juniper-berries, the bark of the Alder-tree, Sassafras, Salt of Tartar, and divers other ingredients, thought to be *Febrifuges*. But the basis of all is the *Bark of Peru*, the rest of the ingredients do no great good. Some do likewise mix with it a little *Opium*, but that ought not to be done without a great deal of precaution.

You must observe to purge your patient well before you give him the *Bark*, because this remedy shuts up the humors for some time, and when they come to ferment a-new, they do sometimes cause more dangerous maladies than he had before, such as *Asthmas*, dropsies, rheumatisms, dysenteries, suppression of the *menses* in women, and many others which have too too often succeeded Cures by this *Bark*. For which reason many diseased persons have again wished for their Ague that were cured by this remedy.

The *Bark* is likewise very ill for those who have any Abscess in their body, for it fixes and hardens the humor for some time, which afterwards ferments and causes a gangrene in the part. You must forbear the use of Milk, and aliments of that nature, when you take this remedy, by reason of their cheefie part, which would lie heavy upon the stomach, and be apt to corrupt in the vessels.

It is probable that the *Bark* does check the humor of the Feaver, much after the manner as an Alkali does stop the motion of an acid salt, that is to say, it unites with it, and makes together a kind of *Coagulum*; this humor does commonly remain quiet a fortnight, and the person cured does find himself a little swelled and heavy, especially if he were not purged, before he took it.

After-

Afterwards the Ague returns because the feaverish humor having been agitated by the Spirits, or else being joyned with other humors of the same nature, which have been preparing in the body during the fortnights respite, it gets quit from the *Bark*, and ferments as it did before.

But sometimes, and that especially when the body of one in an Ague has been well cleansed, if you should persist in continuing the use of the *Bark*, you will so fix the humor that you will dispose it to precipitate and be evacuated, either by stool, or urine, or by insensible perspiration, and the Ague returns no more, for the Spirits in our body do by their motion push outwards, as much as they are able, whatsoever molests the œconomy of the parts.

Tincture of the Peruvian Bark.

This Operation is an extraction of the more oily, and separable parts of the *Bark* by Spirit of wine.

Put into a Bolt-head four ounces of good *Peruvian Bark* grossly powdered, pour upon it Spirit of wine four fingers height above the matter, fit to it another matraass in order to make a double vessel, lute well the junctures, and place your vessel to digest in horse-dung, or in a vaporous Bath, four days: stir it from time to time, the Spirit of wine will load it self with a red colour, unlute the vessels, filtrate the *Tincture* through brown paper, and keep it in a viol well stopd.

It

It is a Febrifuge to be given in Agues, three or four times a day, at a distance from the fitt, and to be continued for a fortnight; the dose is from ten drops to a drachm in some proper liquor, such as Centaury water, or Juniper, or Wormwood water, or wine.

If you put new Spirit of wine to the matter which remains in the matrafs, and set it in digestion as before, you will draw more *Tincture*, but it will not be so strong as the other, wherefore you must give it in a little larger dose.

Remarks.

This *Tincture* works like the *Infusion* I now spoke of; it is a more convenient preparation than the other in this, that it can keep as long as you will, whereas the other does fowr in a little time. Again those who do not love wine will like it better; but I should prefer the *Infusion* before the *Tincture*, because wine is a more proper *menstruum* wherewith to draw the saline and sulphureous substance of a mixt, then Spirit of wine.

You may steep a few Coriander seeds, or a little Cinnamon in the wine or water, and after it is strained off dissolve some sugar in it, and in this you may mix the *Tincture* of the *Bark*, and so make a kind of *Febrifugum Rossoli*, which Infants may be easily made to take of.

Extract of Peruvian Bark.

This Operation is a separation of the more substantial parts of the *Bark*.

Put to infuse warm four and twenty hours eight ounces of *Peruvian Bark* in a sufficient quantity of distilled water of Nuts; afterwards boil the Infusion gently and strain it, make a strong expression of the residue, put it to infuse in new water of Nuts, boil and strain it as before, mix together what you have strained, and let them settle; decant the clear liquor, and evaporate it in a glass or earthen vessel, set in a sand-heat, unto the consistence of thick honey.

It is a Febrifuge that has the same virtues as the former, the dose is from twelve grains to half a drachm, in Pills, or dissolved in wine.

Remarks.

The Wine and Spirit of wine are very proper to draw forth the *Tincture* of the *Bark*, but they are by no means good to make the *Extract* with, because in the evaporation the Spirit carries away with it the more subtile parts of the mixt. The water of Nuts is much more convenient, for besides that it loses less of the volatile substance, it is a little febrifugous itself. Instead of this water you might use those of *Juniper-berries*, the lesser *Centaury*, or *Wormwood-water*.

The

The *Extract* is convenient for those who cannot endure the taste of remedies, for it may be given in Pills wrapped up in a wafer, without partaking of the taste. But I should prefer the Infusion, or the *Bark* in substance, before this preparation, because it is impossible to avoid the evaporation of the more subtile parts in the ebullition of it, use what precaution you will to preserve them.

You may draw the *fixt salt* from the residue that remains, after you have drawn the *Extract*, or the *Tincture*. You must dry it, and burn and calcine the ashes in a crucible, then steep them in hot water ten or twelve hours, boil them an hour, and then filtrate this *lixivium*, and evaporate the water in an earthen pan or glass vessel in sand, there will remain a salt at bottom, which you must keep in a bottle well stoppt. This salt is an alkali, as are all other fixed salts drawn from plants, it is aperitive, it may be given for a quartan Ague; the dose is from ten grains to a scruple in some proper liquor.

You must not think that this salt retains all the virtues of the *Bark*, they are rather all destroyed in the calcination.

Nor may we think to separate the Febrifugous virtue of this *Bark*, by distilling it dry in a Retort; for on the contrary, this would destroy it, by breaking the natural harmony and union of its parts, and you would get only a stinking Spirit, and a burnt oil, which would be of no great use.

C H A P. VII.

Of Cloves.

Cloves are the fruit of a Tree as big as the Laurel Tree, its Bark is very much like Cinnamon, but tastes like the fruit Cloves; it grows in many places in the Indies; it is an admirable stomachick, held in the mouth it preserves from the contagion of ill air.

Oil of Cloves per Descensum.

Take severall large drinking glasses, cover them with a Linnen-cloth, and tie it round each of them, leaving a cavity in each Cloth to put the powdered Cloves into; set a small earthen Cup upon each glass of these Cloves, let it stop so fitly that it may suffer no air to enter between its brim and that of the glass: fill these Cups with hot ashes, to warm the Cloves, and distil down to the bottom of the glass first a little phlegm and Spirit, and after that a clear and white oil; continue the fire until there falls no more, separate the oil in a Tunnel lined with a corner of brown paper, and keep it in a Viol well stoppt.

Some drops of it are with Cotton put into aking Teeth; it is likewise good in Malignant Feavers, and the Plague: the dose is two or three drops in Balm-

Balm-water, or some appropriate liquor. You must mix it with a little Sugar-candy, or a little yelk of an egg, before you drop it into water; otherwise it will not dissolve in the water.

Remarks.

I have given you this Preparation to serve upon an emergence, when you want in haste the *Oil of Cloves*, you must only use hot ashes to warm the *Cloves*, if you desire to have a white Oil, for if you give a greater heat, the Oil turns red, and loses a good part of it. You must also take care to lift up the Cup from time to time, to stir about the powder of *Cloves*. The *Oil of Cloves* may be likewise drawn, if you please, like that of *Cinnamon*.

If you use a pound of *Cloves*, to distil *per descensum*, according to the description I have given, you'll draw an ounce and two drachms of white Oil, and an ounce of Spirit; there will remain thirteen ounces and two drachms of matter, from whence might still be drawn a little red Oil.

It is likely that the *Oil of Cloves* works in easing the tooth-ach much after the same manner as I said the Oil of *Guaiacum* did. But this Oil having an agreeable smell with it, there is no difficulty in admitting the application of this, as there was in the other.

Some do dissolve *Opium* in *Oil of Cloves*, and do use this dissolution for the tooth-ach; they do put one drop of it into the aking tooth, and this allays the pain in a very little time, by reason of the

the *Opium*, but there is one thing to be apprehended from this use of *Opiates*, and that is deafness, some have thereby become deaf, though indeed that rarely happens.

You may rectifie the *Spirit of Cloves* by distilling it in sand. And when you have distilled two thirds of it, you must keep it in a Viol well stoppt, and sling away the phlegm which remains at bottom of the Cucurbite. The *Spirit of Cloves* is a good stomachick, it is good to help concoction, to comfort the heart, to perspire ill humors, and to provoke Seed; the dose is from six drops to twenty in some convenient liquor.

CH A P. VIII.

Of Nutmegs.

Nutmeg is the fruit of a Tree as big as a Pear-Tree, which grows in the Isle *Banda* in the *West-Indies*. It is called *Nucista*, *Nux Moschata*, *Myristica*, *Unguentaria*, and *Aromatites*. While it is green, it is clothed with two Barks, but when it comes to maturity, the uppermost chaps, and lets the second appear, which is tender, and very fragrant. This last Bark is called *Mace*, and improperly the *Flower of Nutmegs*.

The best *Nutmeg* is that which is most weighty; it is mixed in Carminative, & Hysterical Remedies.

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Some

Sometimes a sort of *Nutmegs*, called *Male-Nutmeg*, is found at the Druggist, which differs from the common sort, in that it is longer and weaker.

Oil of Nutmeg.

Take sixteen ounces of good *Nutmegs*, beat them in a Mortar, until they are almost in a PASTE, and put them upon a boulder; cover them with a piece of strong Cloth, and an earthen pan over that; put your cloth over a kettle half filled with water, and set the kettle upon the fire, that the vapour of the water may gently warm the *Nutmegs*; when you shall find upon touching the pan, that it is so hot you cannot endure your hand upon it, you must take off the boulder, and putting the matter into a linnen cloth, take its four corners, and tie them quickly together; put them into a press between a couple of warm plates, set the pan underneath, and there will come forth an Oil which congeals as it grows cold: express the matter as strongly as you are able, to draw out all the Oil; then keep it in a pot well stopp'd; this Oil is very stomachick, being applyed outwardly, or else given inwardly. The dose is from four grains to ten in broth, or some more convenient liquor. It is commonly mixed with Oil of *Mastic*, to chase the Region of the stomach. And this way the green Oils of Anis-feed, Fennil, Dill, and Mace, may be drawn.

Remarks.

Remarks.

The *Nutmegs* must be well beaten, or else they will yield little Oil; this way of warming them is called the *Vaporous Bath*.

The ordinary method is to heat the *Nutmegs* in a kettle, and then expresse them strongly, but because the warming them that way carries off a great deal of its volatile parts, the Oil never proves so good, as when made with the circumstances I have mentioned; for thus the matter heats insensibly by the vapour of the water, and alters not its virtue in the least; and if any water doth mix with the *Nutmegs*, it is easily separated from the Oil. They who desire to have it very fragrant, may set it over a vessel of wine instead of water.

If you draw the Oil from sixteen ounces of Anis-seed, the way I have described, you may obtain from six drachms to nine drachms and a half of it, according to the goodness of the Anis-seed you use, this Oil will be of a green colour.

The Oils of Almonds, Wall-nuts, Cold seeds, Hazle nuts, Poppy, and Behen, must be only beaten, and so put into the press, without heating because they do yield their Oils very easily, and because these Oils are often taken inwardly, it is better to draw them without the help of fire, to avoid the Empyreumatical impression it would otherwise take.

CHAP. IX.

Distillation of an Odoriferous Plant, such as Balm, its Extract, and fixt Salt.

TAKE a good quantity of *Balm* newly gathered, when it is in its vigour: beat it well in a Mortar, and put it into a large earthen pot, make a strong decoction of other *Balm*, and pour of it into the pot enough to swet it sufficiently; cover the pot, and leave it two days in digestion; then put the Matter into a large *Copper Vesica*, and cover it with its Refrigeratory, or Head, Tin'd on the inside: set it in a Furnace, and sitting to it a Receiver lute the junctures with a wet bladder; make a fire of the second degree under it, and distil about half the water you poured upon the *Balm*, then let the Vessels cool, and unlute them: You'll find in the Receiver a very good *Balm-water*, put it into a bottle, and expose it to the Sun five or six days open, then stop it, and keep it for use. It is used in Hysterical Maladies, in the Palsie, Apoplexy, and Malignant Feavers, it is given from two to six ounces.

Express through a linnen cloth strongly that which remains in the body, and let the Expression settle; filter it, and evaporate the water with a gentle heat in an Earthen vessel, until there remains an Extract in the consistence of thick hony.

'Tis

'Tis a good remedy for such diseases as proceed from corrupt Humors, it works by perspiration, or by Urine: the dose is from a Scruple to a Drachm, dissolved in its proper water.

Dry the Residue that remains after expression, and burn it with good store of other *Balm* likewise dried, you may obtain an Alkali salt from the ashes by a *Lixivium*, the same way I spoke of concerning the salt of *Guaiacum*.

This Salt is Aperitive, and Sudorifick, the dose is from ten grains to a Scruple in *Balm-water*.

The Water, Extract, and Salt of all Odoriferous Plants, such as *Sage*, *Marjoram*, *Time*, *Mint*, *Hyssop*, &c. may be drawn after the same manner.

Remarks.

Perhaps some will think it strange that I add water for the distillation of *Balm*, but those who use to work on this sort of Herbs do know well enough, that being dry substances of themselves, there is no good distilling them without first wetting them; and besides, the water that is added doth only serve to imbibe the volatile parts, as the Fermentation operates; and when the matter is heated, the more spirituous part as being the lighter rises first, and savours much less of the *Empyreume*, than if the herb were distilled without first wetting it.

You must observe in these distillations to give a fire from the second to the third degree, because if it were made too little, none of the Essential or volatile Salt of the Plant would rise; and if it

were too strong, the water would taste of the *Empyreume*: wherefore to make a good distillation, you must let one drop follow another slowly.

The waters so soon as they are distilled, have commonly no great smell, but when they have lain some time in the Sun, their spirituous parts that were condensed in the *Phlegm*, do display themselves, and exert their activity; for which reason it is that the water becomes fragrant which was not so before.

The Extract doth contain almost all the Essential Salt of the Plant, wherefore it is of greater virtue than the water; you must take care to Evaporate the liquor with a mild heat, for fear too much should carry off this salt, which is but too volatile of its own nature; for it is in the salt that the principal virtue of the Plant doth consist.

C H A P. X.

Distillation of a Plant that is not Odoriferous, such as Carduus Benedictus, and its Essential Salt.

TAKE a good quantity of *Carduus*, when it is in its prime; pound it in a Mortar, and fill with it two thirds of a Limbeck; draw by expression a sufficient quantity of the Juyce of other
Carduus,

Carduus, and pour it into the Limbeck, that the herbs swimming in the Juyce may incur no danger of sticking to the bottom during the distillation: distil with a fire of the second degree about half as much water as you used juyce, this water is Sudorifick. It is used to drive out the Small-Pox, and in the Plague.

Exprefs through a cloth that which remains in the Limbeck, let the juyce settle, and after it is filtered, Evaporate with a small fire about two thirds of the liquor, in an earthen or glass vessel: set this vessel in a cool place, and leave it there eight or ten days, there will shoot out Crystals round about the vessel, separate them, and keep them in a Viol well stopd. These Crystals are called the *Essential salt*; it is Sudorifick, the dose is from six to sixteen grains in its proper distilled water.

The *Extract* of *Carduus* may be likewise made the same way that I described for *Balm*.

Remarks.

Succory, *Fumitory*, *Sorrel*, *Scabious*, *Cresses*, and all other Plants that are not Odoriferous, which yield good store of Juice, must be distilled like the *Cardum Benedictum*, and this method may serve to draw the *Essential Salt* out of any plant whatsoever.

The hot Plants have much more of this Salt than others; *Lettice* contains less than *Succory*, *Succory* less than *Sorrel*, and so of the rest.

Seeing it is in the Salt that the virtue of the plant consists, I would advise rather to use the decoction of Plants than their distilled water, when the Plants are in season, and when they are out, then to have recourse to distilled waters, and mix with them a little of their *Essential Salt*, or *Extract*.

The fixt Alkali Salt may be drawn from the remainder of the Plant, in like manner as I have shewed to draw that of *Guaiacum*.

CH A P. XI.

Of Sugar.

S*ugar* is the essential salt of a reed or cane that grows in many places, and especially in the Western Islands. The pulp in the trunk of this plant is taken and washed, and then steeped in hot water, this water is strained, and evaporated, and the *Sugar* remains at bottom; heretofore it was called *Mel arundinaceum*, or the Cane-honey, but since it has been called *Zucharum*, or *Saccharum*.

The first elaboration that is given to *Sugar*, is to purifie it, by dissolving it in water, filtrating and evaporating the liquor, after which it is made up into Loaves, or else it is sent in Casks or Chests, and is called *Cassonnade*, or *Castonnade*. There are of it the red, the brown, and the white

Sugar,

Sugar, according as it has been more or less purified, it differs in colour. The name *Castonnade* may have been derived from the Casks in which it is brought, called *Cast* by the Germans.

When the *Sugar* has been refined no more then abovesaid, it is a little fat; now to refine it farther it is dissolved in Lime-water, it is boiled, and the scum taken off; when it is sufficiently boiled, it is cast into molds of a Pyramidal form, which have a hole at bottom to let the more glutinous part run through, and separate.

It is still farther refined by boiling it with the whites of eggs in water, for the glutinous quality of the whites of eggs does help to receive and take away the impurities which might remain in the *Sugar*, and the boiling of it serving to drive them all to the sides of the vessel in a scum, the liquor is passed through a cloth, and then evaporated to a due consistence.

Sugar-Candy is only a *Sugar* crystallized; the way to make it, is to boil refined *Sugar* in water to the consistence of a thick Syrop, it is then poured into pots, wherein little sticks have been laid in order; it is left in a still place some days without stirring, and you have the *Sugar-Candy* sticking to those sticks. *Red Sugar-Candy* is made after the same manner.

Sugar is good for infirmities of the breast and lungs, because it does attenuate and cut the phlegm which sometimes oppresses the fibres of these parts, but you must use it as little as may be in hysterical cases, by reason that it raises vapours. *Red-Sugar* is sometimes mixed with deterfive Clysters.

Its

Its sweetness does proceed from an essential acid salt mixed with some oily parts of which it consists, as I have already explicated in the Remarks upon *Oil of Antimony* prepared with Sugar.

The *Cassennade*, or Cask-sugar makes a sweeter impression upon the tongue than our finer Sugar, because it contains more viscous or fat parts, which do remain the longer upon the nerve of the tongue, and this makes us sometimes prefer the first, as to use, before the other. And for the same reason the finer a Sugar is, the quicker it passes off the taste. *Sugar-candy* is better for Rheums than common Sugar, because being harder it requires a longer time to melt in the mouth, and besides it keeps the breast moister than the common Sugar.

Spirit of Sugar.

This Spirit is a mixture of the acid part of Sugar with the Flowers of *Sal Armoniack*,

Powder and mix eight ounces of white Sugar-candy with four ounces of *Sal Armoniack*, put this mixture into a glass, or earthen body, whose third only is thereby filled, fit a head to the body, and place it in a sand-furnace; joyn a receiver to it, and lute well the junctures with a wet bladder, give it a small fire for an hour only to heat the vessel, then increase it to the second degree, there will distil a liquor drop by drop, and towards the end there will rise white vapours into the head; increase your fire still more, until nothing more comes forth; let the vessels cool and unlute them,

them, you will find in the receiver seven ounces of a brown liquor, that has but an ill smell, and a little black oil stuck to the sides, pour it all together into a glass-body, and having fitted to it a head and receiver, and luted the joints, distil in sand six ounces of a very acid spirit, that is clear and agreeable to the taste, and without any smell of Empyreum.

It is a good aperitive against the gravel, and the dropsie, it is good to stop *diarrhea's*, and dysenteries with, it may be dropt into the Tincture of Roses, instead of other acid Spirits. Some do think it good for diseases of the breast; the dose is eight or ten drops, or to an agreeable acidity in some proper liquor.

That which remains in the body after the rectification is a foetid oil, which may be outwardly used to cleanse old ulcers.

Remarks.

The Spirit of common Sugar is made without addition of any thing in the preparation; it is an acid Spirit, but is not so strong, nor has so great virtues, as that which I have now described. It is thought good for diseases of the breast, by reason of the Sugar, which indeed is good for them, but so strong an acid is apt to give a Cough.

The body must be big enough, in order to give room to the vapours to circulate in, as they do rise.

A very little Oil of Sugar can be drawn in this operation; for that which remains after the rectification

fication is not a pure oil, but a remainder of the Spirit tinged with some drops of oil, inſomuch that it would be very hard to get one drachm of pure Oil.

CHAP. XII.

Of Wine.

W*ine* is nothing elſe but the *Muſte*, or juice of ripe Grapes, whoſe Spirituous parts are ſet at liberty in the Fermentation. This *Wine* is more or leſs groſs, according as it abounds more or leſs with *Tartar*.

In the making of *White-wine*, the *Muſte* of white Grapes is left to Ferment all alone; but *Claret* muſt Ferment with the *Feces* of the Grapes; whence it comes to paſs that the Red is loaded with more *Tartar* than the White, and remains longer in the body after it is drunk. The wines of hot Countrys do commonly more abound with *Tartar* than others, by reaſon of the abundance of Salts which they attraſt from the earth. *Muſcat*, and *Spaniſh Wines* do not endure a Fermentation, until good part of the Phlegm is evaporated, either by the heat of the Sun, or by fire; and this is the reaſon they become ſo glutinous as they do, almoſt like Syrup. Laſtly, there may be made as many different *Wines*, as there can be different Ferment-

Fermentations to the *Muske*. Now let us consider what it is that happens in these Fermentations.

Muske is a sweet liquor that sends no vapours to the head to Intoxicate, though one drinks never so much. If you distil it, there will rise first of all, good store of *Inspid water*, after that a fetid *Oil* with a few weak *Spirits*, which are nothing but an *Essential Salt* dissolved; and lastly there will remain a terrestrious mass, out of which may be drawn some quantity of fixt salt by making a *Lixivium*, as we draw other alkali salts; but among all these substances we find none of those *Spirits* that use to make *Brandy*, and yet nevertheless when *Muske* hath Fermented for some time, it turns into *Wine* from whence you may draw a considerable quantity of Inflammable *Spirits*.

Now to explicate this effect you must know that *Muske* doth contain a great deal of *Essential Salt*; this Salt like a volatile, making an effort in the Fermentation to deliver it self from the oily parts with which it was before incumbred, does open and divide them, until by its subtile and keen points it hath rarified them into Spirit; this effort of the salt does cause the Ebullition which happens to wine, and which at the same time does help to purifie it; for it separates the grosser parts of the wine in form of a scum, of which some part does stick to, and petrifie on the sides of the vessel, and another part precipitates to the bottom, the first is called *Tartar*, the last the *Lees* of wine. The inflammable *Spirit of Wine* then is nothing but an Oil exalted by Salts, and this is an indubitable proof of what I establish, that there was nothing but oil in the *Muske*, which was capable of taking

fire:

fire: these same salts also being a little freed from the cover they were wrapt in, are they that change the wallowish sweetness of *Muste* into an agreeable Tartness, such as we perceive in our *French Wines*.

It is likewise remarkable that a sufficient quantity of Phlegm is requisite for the better separation of the Salts in their Fermentation, and an Exaltation of the Oil; for otherwise several changes are apt to happen: for example, when *Muscat*, and *Spanish wine* are made, a great deal of Phlegm is separated from them; for the *Muscat Grape* is left to dry in the Sun upon the Branches, before it is gathered to put into the press, and some part of the liquor of the *Muste*, with which *Spanish wine* is made, is Evaporated before it is suffered to Ferment; which is the cause that the Salts not having liberty to expatiate, and to rarifie the Oil as much as they would do if they had room, do make but an imperfect Fermentation. The Oil being thus half exalted, hath still strength enough to hinder the Tartness of the salt, and therefore only tickling the Nerves of the tongue, makes us perceive in these liquors a sweet taste. And this is also the reason, why fewer Spirits are drawn from *Muscat* and *Spanish wines*, than from *French wines*; for whereas the Spirit of Wine doth consist in a rarified Oil, there must needs be fewer Spirits in those, than in *French wines*. But much more of a gross Oil is drawn by distillation from those half fermented Wines.

If on the contrary the *Muste* should be loaded with too much phlegm, as it happens often enough, there follows another imperfect Fermentation, because

cause the Salts being too much weakned by it are not able sufficiently to cut and exalt the parts of Oil, whence it comes to pass that these Wines are subject to turn aigre, or to sowre. The Wines of *Languedoc* and *Provence* being extreemly loaded with *Tartar*, are grosser than the Wines of *Burgundy* and *Champaigne*, because their Spirits are incumbred with abundance of Salt and Earth. Wherefore the goodnes of Wine may be said to proceed from a convenient proportion of phlegm and *Tartar*.

It is objected to this last discourse, that the *Tartareous* part being in a natural way separated from the Wine, should in no wise diminish the quantity nor the strength of the Spirituous and inflammable part.

But when I asserted that the Spirits of divers Wines are extreemly loaded with *Tartar*, I did not mean that *Tartar* which petrifies at the sides of the vessels, for that is at quiet, and does not hinder the Exaltation of Spirits; but I intended a *Tartar* that still remains mixt in the Wine after the Fermentation, and which according as it abounds more or less, does render the Wines more or less thick and gross. It is easy to see this *Tartar* I speak of, if you Evaporate the aqueous part of Wine, for it will remain at bottom in form of Lees. Nevertheless there is no need of establishing two sorts of *Tartar* in one kind of Wine, for the former is only the more soluble part of the other.

Divers little Objections have likewise been made me on this subject, for want of duly examining what I have established. Wherefore I do not desire to enlarge in the relation of them,
for

for I do aim as much as I can, to avoid Repetitions, as being good for nothing but to swell a Book and tire the Reader.

Wine diminishes the appetite, as saith *Hippocrates*, and the cause may be, because the Sulphureous Spirits it is charged with, do dull and oppress the Ferment of the Stomach, which by its irritation caused hunger.

Vinous liquors may be made of all Fruits, and many other things, by means of Fermentation, as from Apples, Pears, Honey, and Hopps. In like manner Berries, Seeds, Leaves, and Flowers, may be made to Ferment: but because several of these things are naturally too dry to ferment easily, they must be wetted with water, after they are beaten; and to quicken their Fermentation, a little *Yeast* is to be added, and by this means liquors are made, whence burning Spirits may be drawn, as well as from *Wine*.

That which happens in the fermentation of Wines, may serve very well to explicate many diseases, but especially the *Small Pox*, for it is very probable that in this disease the blood does boil and ferment in the vessels much after the manner as *Wine* ferments in a vessel.

The little *pustules* of the *Small Pox* are a *Tartar* which is separated from the blood to the skin, after the same manner as the *Tartar* separates from the *Wine* to the sides of the vessel, and indeed they have the same effect as salt in corroding the skin.

Infants are more subject to this disease than elder persons, because their blood is more like to *Muske*, and consequently is more subject to ferment.

The

The *Small-pox* does usually happen but once in a mans life, just as *Muske* does ferment also but once.

Distillation of Wine into Brandy.

Fill with Wine half a large Copper body, cover it with its *Moors head*, bordered with its *Refrigeratory*, and fit to it a *Receiver*; lute well the junctures with a wet Bladder, and distil with a gentle fire, about a quarter of the Liquor, or else until the liquor which distils doth not burn; when fire is put to it, that which is in the Receiver is called Brandy, and in French, *Aqua vita*.

Remarks.

Brandy is a Spirit of wine loaded with phlegm, that it hath carried with it in the distillation; these Spirits do always rise first, and so it is known that there remain no more in the Cucurbite, when the liquor that distils is no longer inflammable.

Brandy may be drawn from all sorts of Wines, but more of it may be drawn in some Countries than others. For example, the Wines that are made about *Orleans* and *Paris* do yield greater plenty of *Brandy* than many others which seem to be stronger; and the reason is, that those Wines which appear stronger, being loaded with a great deal of *Tartar*, have their Spirits as it were fixed, whereas the others containing but a convenient portion of this *Tartar*, do leave their Spirits at greater liberty.

E e

When

When Wine has been drunk, there is made a separation of Spirits in the body, much resembling that which is made by distillation : for the heat of the bowels warming it, causes the Spirituous parts to spread on all sides through the pores, and some part of them to mix with the blood, and rarefie it, from whence it comes to rejoyce the heart, and encrease the vigour of the whole body ; but because these Spirits do always tend upwards, the greatest part flies into the brain, where it quickens its motion, and produces a certain gaiety of mind that is wont to furnish us with many excellent thoughts.

But now if wine moderately taken is so profitable for the Functions of the body, it likewise causes many mischiefs, when it is excessively used ; for the Spirituous parts rising in great abundance do circulate in the brain with so much celerity, that they soon confound the whole Oeconomy. And then the objects will appear double, and the walls of the place where one is, seem to have changed their ordinary situation.

This Confusion remains until the Spirits having some good time dissolved the phlegm, do in part condense with it, and in part spend through the pores.

It likewise then happens, that a man is prone to sleep, because the *Pivvita* being attenuated either by the Spirits of wine, or by the phlegm they have drawn along with them, glides into the small passages of the brain, and retards the Circulation of the Animal Spirits, by gluing them together ; for after the same manner as the motion of the Spirits in the Brain doth beget watchfulness, so their re-
pose

pose or condensation produces sleep. But I shall speak more amply of this subject hereafter, when I come to treat of the effects of *Opium*.

The sleep which is caused through excess of Wine doth usually remain until the Animal Spirits have rarefied this phlegm, and opened a free passage. Those who are intoxicated with Beer, Sider or some such like liquor, do remain in their Drunkenness a longer time, and sleep more after it, than those who are drunk with Wine, because the Spirit of these liquors, carrying along with it a viscous phlegm into the brain, remains a longer time in the disengaging it self, and passing through the pores. Again it is the viscosity of this phlegm, which entring into the *Sinus* of the brain, does cause so long a sleep, because it is so hard to rarefie.

Those Accidents that I have related to proceed from the immoderate use of Wine, are but the first, and the less grievous, though indeed they are but little to be desired; every body knows that a continuation of frequent debauches doth at last render a man dull and stupid, and this by reason the Spirits of Wine do not only trouble the Natural Spirits in their functions, and render them Phlegmatick, but likewise by rarefying them do ever carry off and lose some store of them.

These Persons are likewise subject to a continual spitting, or else they are molested with defluxions, Catarrhs, and Gout, because the *Pituita* being rendered more liquid by the Spirits and phlegm of vinous liquors, is forced to descend through the Lymphatick vessels; but if there happens to be the least obstacle in these vessels, it takes its course with the Nerves, and falls upon all the parts of the

body. Lastly, when excess of wine does occasion falling into the Apoplexy, and Palsie, it is by reason the *Pituita* is rendred too liquid by the Spirits and Phlegm of wine, and causes Obstructions in the head, and hinders the natural course of the Spirits into the Nerves. Many other sad effects of wine-debauches might be here mentioned, but this digression is too long. Let us return to our Operation.

After the wine hath been deprived of these Sulphureous Spirits, there remains in the body a Tartareous liquor, which being exposed a good while to the Sun in a Cask without its stopple, turns into good Vinegar.

It may be some such thing happens in the Bodies of those who accustom to drink too much wine; for whereas the volatile parts, which ascend to the Brain and Heart, by an agitation of the Spirits, do beget Joy; so on the contrary the Tartareous parts by fixing the humors about the *Hypochondria*, do cause by little and little that which is called Melancholy, which proceeds from an acid; whence it comes to pass that many men making a debauch upon wine, with design to pass away their Melancholy, do afterwards find they have encreased it, when the debauch hath had its effect.

If you would by way of curiosity make an exact *Analysis* of wine, you must take that which remains in the body after distillation of the *Brandy*, and distil off all the phlegm, there will remain a Matter like unto Rosine, put it into a Retort, and placing it in a Furnace, distil away more phlegm, in a small fire, until it begins to come sharp. Then fit a large Receiver to the Retort, and luting well the

the junctures, strengthen the fire by degrees, to drive forth acid Spirits, and a little fetid Oil, continue the fire until there comes no more.

The Oil is separated from the Spirit in a Tunnel lined with brown paper; for the Spirit will pass through, and the Oil being too thick will remain. But it is here remarkable, that more of this Spirit and Oil is drawn from *Muske*, than wine; which sufficiently proves the Remark I made before, touching the origine of the volatile Spirit of wine; for seeing good store of the Oil of *Muske* hath contributed to the making volatile Spirit of Wine, there must needs remain but very little Oyl, in the liquor that *Brandy* is drawn from.

The acid Spirit of wine, and the Black Oil, are like to those of *Tartar*, which I shall describe anon. And an alkali salt wholly resembling that of *Tartar* may be drawn by a *Lixivium* from the mass that remains in the Retort.

Spirit of Wine.

Spirit of Wine is the oily part of wine rarefied by acid Salts.

Fill a large bolt-head with a long neck, half full with *Brandy*, and fitting a head and Receiver, lute close the junctures; set your bolt-head upon a pot half filled with water, to distil in a vaporous Bath, the Spirit, which separates from the phlegm, and rises pure: continue this degree of fire until nothing more distils, thus you'll have a dephlegmated *Spirit of Wine* in the very first distillation.

It serves for a *Menstruum* to a great many things in Chymistry; half a spoonful of it is given to Apoplectical, and Lethargical persons, to make them come to themselves; likewise their Wrists, Breast, and Face are rubbed with it. 'Tis a good Remedy for Burnings, if applied so soon as they happen; and it is good for cold pains, for the Palsie, Contusions, and other Maladies, wherein it is requisite to discuss, and to open the pores.

Remarks.

The usual way of making *Spirit of Wine*, is by distilling *Brandy* in a Limbeck so many times over until it comes pure; and to do this, about half the *Brandy* is drawn by distillation, and the phlegm that remains at bottom accounted of no use. Again, half the Spirit which was distilled is anew drawn off, and the phlegm thrown away; these Rectifications are continued, until you find by firing a spoonful of the Spirit, that every drop burns, and there remains not the least Phlegm; but because this Operation is very tedious, and it is a hard matter thus to get a *Spirit of Wine* wholly free from Phlegm, even after nine or ten times repeating these distillations, let the fire be never so small; Artists have invented a long Machine, which they call the *Serpent*, by reason of the circumvolutions which it makes. It is fitted to the Cucurbite containing the *Brandy*, and the top made like a Tunnel receives the head, to which a Receiver is fitted, and the junctures well luted, and the vessel placed in a small fire, the *Spirits of Wine*

Wine do rise by this gentle heat, but the phlegm being too heavy cannot ascend so high, so that thus a *Spirit of Wine* deprived of its phlegm is had the very first time. But because this Machine is hard to carry into the country, and other places where one would desire to make *Spirit of Wine*, and besides that it is subject to loosen in the joints, through the violence of the Spirits; I have thought that the way I delivered for making *Spirit of Wine* was more commodious; for provided you have but a matrafs and a head, it will be an easie matter to draw as good *Spirit of Wine* as that by the *Serpent*, and there's no need to fear the Spirits breaking any way out of the vessel, if you do but lute well the junctures, as I have said.

The matrafs must have a very long neck, that no phlegm may be able to rise into the Receiver.

The vaporous Bath is fitter than any other to perform this Operation in, because a most moderate heat is requisite to raise up the Spirits all alone; now the vapour of water warms very insensibly. You must continue the same degree of fire, until there comes nothing more.

Some persons do endeavour to reject the method that I have described for drawing *Spirit of Wine*, because, say they, a long time is required to draw a little *Spirit*, and by reason of the difficulty they conceive in procuring such vessels well made, at *Paris*, and much more so in the Country.

But it is likely these Gentlemen do blame this method because they never tried it; for if they had but taken the pains to make *Experiment* of it, they would have found that with two or three of these vessels, they might have drawn as much *Spirit*

of Wine, as they could be able to do with their great Machine; and that this *Spirit* is not liable to the impression which might be communicated to it from *Copper* or *Tin* vessels. As for the difficulty that there is pretended of getting such glass vessels, there is none at all that I know of, but only for such as will not take the pains to visit the Glass-houses, for there they would find enough for their turn; and though I use a great many of them in my *Courses of Chymistry*, I never was to seek for any yet. But suppose there were none to be found ready made, methinks they might as easily bespeak them, and have them made at the Glass-houses, as well as bespeak those grand *Copper* or *Tin* Machines, that are commonly used. I know that such as are better pleased with making a Fair shew, than with the effects of things, and who measure the goodness of an Operation by the trouble it gives one, and by the greatness of vessels and Furnaces, will find here but little to their satisfaction. But I am very little concerned at such mens exceptions, I never endeavoured to follow their Track. My design is simply to facilitate the means of working in *Chymistry*, and to take away, as much as lies in my power, those things which render it mysterious and dark.

Spirit of Wine is good for Lethargical, and Apoplectical persons, because it puts the Spirits into a greater motion than they were in before. Now because according to all appearance these Diseases are caused by Obstructions which hinder the course of the Spirits into the Brain, this Spirit serves to give them a new vigour, to dissolve and rarefie these Tartareous viscosities which shut up their passage.

passage. It likewise discusses Tumors and Defluxions, because it not only opens the pores, and gives vent to the subtler part of the humor to perspire, but likewise dissolves and rarefies the grosser part, so as to render it fit to circulate with the blood.

The *Spirit of Wine* is excellent for Burnings, provided it be used so soon as they happen; for then it opens a passage for the igneous particles to come out at, and if there should remain any within the part, it unites with them as it uses to do when mixed with an Acid.

Spirit of Wine Tartarised.

This preparation is a *Spirit of Wine* that has carried with it some portion of *Salt of Tartar*.

Put a Pound of *Salt of Tartar* into a long glass-body; pour upon it four pounds of *Spirit of Wine* prepared as I said before: place your vessel in Sand, and cover it with a head to which fit a Receiver, lute well the junctures with a wet Bladder, and give it a gradual fire, which continue until three parts of the *Spirit of Wine* are risen; then remove the fire, and keep this Spirit in a Viol well stopt; it hath the same virtues as the other, but is more subtil.

The liquor that remains in the body may be evaporated, and a *Salt of Tartar* got as good as before.

Remarks.

Remarks.

This Operation is only a Rectification of the *Spirit of Wine*, to render it more subtile than it was before; because the *Salt of Tartar* becomes impregnated with the Phlegmatick parts, and hinders them from rising.

The *Spirit of Wine* doth likewise volatilize, and carry along with it some portion of the *Salt of Tartar*, which gives it a very agreeable smell, and renders it a good Remedy for Obstructions.

A sign, that the *Spirit of Wine* has carried along with it some of the *Salt of Tartar*, is this: if you dry gently the *Salt of Tartar* that remains in the Body, and weigh it, you'll find it diminished an ounce and a half.

You may again put this *Spirit of Wine Tartarized* to half a pound of more *Salt of Tartar*, and distil it as before; but I have found that it is never a-whit the better for it.

This way of *Tartarizing Spirit of Wine* is the very best and shortest of all that have been invented, whether you desire to make it pure, or to impregnate it with *Salt of Tartar*; and I may venture to say, that all the many long and tedious descriptions that have been given of this Operation, have been only invented to cast a dust into the eyes of *Novices*; for it is easie for any to observe, who give themselves a little to examine things, that after all their long turnings and windings, and circumstances to no purpose, the *Spirit of Wine* is not so well *Tartarized*, as by the plain method that I have described.

Queen

Queen of Hungary's Water.

This Operation is a *Spirit of Wine* impregnated with the more essential part of *Rosemary flowers*.

Fill a glass or earthen cucurbite half full with *Rosemary Flowers*, gathered when they are at their best; pour upon it *Spirit of Wine* sufficient to infuse the *Flowers* in; set your Cucurbite in a *Balneum*, and joyning its head, and Receiver, lute close the junctures, and give it a digesting fire for three days, after which unlute them, and pour into the Cucurbite that which may have been distilled. Refit your Alembick, and encrease the fire strong enough to make the liquor distil, so as one drop may immediately follow another; and when you shall have drawn about two thirds of it, and put out the fire, let the vessels cool, and unlute them, you'll find in the Receiver a very good *Water of the Queen of Hungary*, keep it in a Viol well stoppt. It is good in the Palsie, Lethargy, Apoplexy, and Hysterical Maladies: The Dose is from one drachm to two. It is likewise used outwardly for Burnings, Tumors, Cold pains, Contusions, Palsie, and all other occasions, wherein it is requisite to revive the Spirits. Ladies do use to mix half an ounce of it with six ounces of Lily-water, or Bean-flower water, and wash their Face with it, to clear their complexion.

Remarks.

Remarks.

You must distil this water in a Fire that is strong enough, for otherwise the *Spirit of Wine* would rise alone, or else draw along with it but very little *Essence*, as I have observed in the working upon it.

The Oyl or *Essence of Rosemary*, may be made as the Oyl of *Cinnamon*, and some drops of it mixed in the *Spirit of Wine*, and hereby you have a *Queen of Hungary's water* made upon the spot.

The *Water* of the *Queen of Hungary* sometimes gives ease to the Tooth-ach, being snufft at the Nose, or applied to the Gums with a little Cotton.

Some thinking to Criticize a little, do say, it is altogether usefess to digest *Rosemary flowers* with *Spirit of Wine*, because their substance being of a very Volatile nature, it easily dissolves in the Spirit without any digestion.

But this Circumstance is very necessary, if we desire to have a *Water* well impregnated with the *Essence* of the *Flowers*, for although there is a Volatile substance in *Rosemary*, yet good part of the Oil, in which consists principally the Smell, is involved in the other Principles, and cannot be well rarefied, mixed, and exalted, but only by a digestion: and thus we have a very good effect from it.

C H A P. XIII.

Of Vinegar.

W*ines*, like all other liquors that use to Ferment, do grow sower by the dissolution of their Tartar in a second Fermentation: This dissolution is commonly made, when upon the Wines going to decay, some of the more subtile Spirits are lost; for the Tartar taking their place fixes the rest of the Spirits which remain in the Wine, so that they can act no longer. This fixation is the cause that when the Wine turns sower, very little quantity of it is diminished, and very little Tartar is found in the vessels wherein *Vinegar* is made.

To the end that Wine may quickly sower, you must set the Vessel that contains it in some hot place, and mix the Lees from time to time; for this Tartar will easily dissolve, when heat comes to act upon it.

Perhaps it will be objected that Wine deprived of Tartar and Lees does grow sower, when kept a long time in a vessel, without any dissolution of Tartar.

But we must consider that Wine, let it be as clear and pure as may be, does always retain the more saline and subtile part of Tartar, which exalts and easily smells, when by Fermentation it gets the predominancy of the Sulphureous Spirits, which

which held it as it were involved : and thus clear wine fowrs alone, but it does not fowr so fast, and the Vinegar is not so strong, as when it is made upon Tartar.

Furthermore if we consider the Principles that wine consists of, we shall find, that neither the Oil, nor Earth, nor Water, are capable of yielding any Acidity, and that nothing but the Salt is able to give it. Now it cannot be doubted but that the Salt of wine is in the Tartar.

It may be added here, that the Air to which wines are exposed, by leaving the vessel open, when they would have them turn into Vinegar, does likewise communicate a little of its Acidity to the wines, by exciting and rarifying the Acid of Tartar.

Distillation of Vinegar.

Put six quarts of strong Vinegar into an earthen pan ; evaporate in a *Balneum* about a quart, which is the Phlegmatick part ; and pour that which remains into a glass or earthen Cucurbite, and distil it in a strong sand-heat, until there remains at bottom nothing but a substance like Honey ; keep this *Vinegar* well stopt, many do call it *Spirit of Vinegar*.

Its principal use is to dissolve or precipitate bodies. It is sometimes mixed in Cordial potions, to resist putrefaction ; the dose is half a spoonful : it is mixed with water, and this *Oxycrate* is used to stop Hemorrhagies, taken inwardly, and to assuage Inflammations, applied outwardly.

Remarks.

Remarks.

The Acidity of *Vinegar* consists in an Essential, or Tartareous Salt, which being heavier than the Phlegm rises last; but you must evaporate this Phlegm very gently, because the Acid Spirit of *Vinegar* will easily sublime with it.

I do use an earthen pan, rather than a Cucurbite, that the Phlegm of *Vinegar* finding a large open passage may evaporate the more easily.

It would be no great fault, if you should distil the *Vinegar* without dephlegmating it first; for the separating the phlegm from it is not of so much consideration, as to make it as clear as pure water, that it may not bestow any particular tincture to the ingredients that are to be dissolved in it.

The Spirit of *Vinegar* is much less fixed than many other acids, because it partakes of the Sulphureous Spirits of wine which still remain in it.

Common Vinegar keeps its strength a longer time than the distilled, because it contains a more Terrestrial Salt, that doth not Volatilize so easily. And for this reason, you should rather chuse to use *Vinegar* newly distilled, than that which hath been kept a good while. All Acids do prove Cordial, and good against malignity of humors, when it is caused by too great a commotion, because it fixes and Coagulates them, moderating their motion. Thus in places where the Air is corrupted, and Pestilential, *Vinegar* is a good Preservative; you may every morning take half a Spoonful of it Fast-ing; but in diseases which proceed from a Tartareous

reous humor, as the Hypochondriack melancholy, it is rather hurtful than good, because it fixes the humors the more.

Some having dried and calcined the sweet extract that remains at the bottom of the Cucurbite, after the distillation of *Vinegar*, and having by Solution, Filtration, and Coagulation, separated from it an Alkali fixt salt, much like to that which is drawn from Tartar, they do mix it with *Spirit of Vinegar*, and distil and cohobate it divers times, until, say they, the spirit has carried off all the salt, and then will needs have it called *Spirit of Vinegar Alkalized*, or *Radical Spirit of Vinegar*, and they affirm that this being much more pure, and entirely united with its proper salt, is much the more powerful in dissolving Metals. But the distilled *Vinegar* is so far from becoming the stronger through this Preparation, that I can demonstrate that it breaks and loses the greatest part of its edges in contending with the Alkali salt, with which it is mixt, for it is the property of this salt to sweeten Acids.

Neither is it necessary to believe that by distillations is so drawn the Alkali salt of *Vinegar*, for it remains fixt at bottom of the Retort with the acids it is impregnated with; so that this same *Spirit of Vinegar* to which so many great names and uses have been appropriated, is properly the more Phlegmatick part of distilled *Vinegar*.

C H A P. XIV.

Of Tartar.

ANY gross or terrestrious matter, that sticks to the sides of the vessel, when separated from its liquor by means of Fermentation is called *Tartar*. But the *Tartar* I am going to speak of here, is that of *Wine*. It is found sticking to Casks like a very hard stone, sometimes white, and sometimes red, according to the colour of the wine it comes from.

White *Tartar* is to be prefer'd before red, because it is purer, and contains less earth; both one and t'other are had in greater abundance in hot Countries, such as *Languedock* and *Provence*, than many other Climats; but the best white *Tartar* of all is brought out of *Germany*, it must be heavy, White, and Crystalline.

The *Lees* of wine are likewise a liquified *Tartar*, they are burned, and the Ashes that are made of them are called *Cineres Clavellati*, in English, *Gravelled Ashes*.

Crystals of Tartar.

This Operation is a *Tartar* purified, and coagulated in form of Crystals.

F f

Boil

Boil in a great deal of water what quantity of white *Tartar* you please, until it be all dissolved; pass the liquor hot through *Hippocrates his Sleeve*, into an earthen vessel, and evaporate about half of it: set the vessel in a cool place two or three days, & you'll find little *Crystals* on the sides, which you are to separate; evaporate again half the liquor that remains, and remit the vessel to the Cellar as before, there will shoot out new *Crystals*: continue doing thus, until you have gotten all your *Tartar*, dry the *Crystals* in the Sun, and keep them for use.

The *Crystal of Tartar* is Purgative, and Aperitive; it is good for Hydropical, and Asthmatical persons, and for Tertian and Quartan Agues. The dose is from half a drachm to three drachms in broth, or some other proper liquor.

Remarks.

This Operation is, to speak properly, nothing but a Purification of the more Terrestrious parts of *Tartar*. You must observe to boil it in an earthen vessel, rather than any metallick one, because it would be apt to take some Tincture from it.

A *Skin* that swims a-top after evaporation of some part of the liquor was heretofore carefully taken off, and there was thought to be some difference between it, and the *Crystal of Tartar*. But this *Cream or Skin* is only a part of the *Tartar* that begins to Coagulate, and so it is the very same thing in substance with the *Crystal*.

You

You must not imagine that the *Crystals* of *Tartar* do much differ from *common Tartar*, for they differ from it only in the containing a little less earth, but all the five Principles may be drawn from the *Crystals*, as from *common Tartar*.

When you would take the *Crystals* in substance you must make them into *Pills*, or into a *Bolus*, with some liquid substance; or else you may boil them in some liquor, but you must take the liquor very hot, otherwise the *Crystals* will fall to the bottom of the cup you drink out of.

If you should boil these *Crystals* in common water, or in broth, and then let it stand to be cold, they will return into the same form they were in before, both at the bottom, and on the sides of the vessel, but the liquor will remain a little sharp, through the solution of some part of the salt of *Tartar* into it.

I see no reason so much to wonder as some do, why *Tartar* will not dissolve in cold water; for although it does contain a great deal of salt, this salt is involved in *Earth*, and *Oil*, which must needs hinder the dissolution, and there is no need of having recourse, for an explication of this, to a proportionable Union of Volatile salts and acids.

Soluble Tartar.

Powder and mix together eight ounces of *Crystals of Tartar*, and four ounces of the fixt salt of *Tartar*, put this mixture into a glazed earthen pot, and pouring upon it three pints of common water, boil the matter gently for half an hour,

F f 2

then

then letting it cool, filtrate and evaporate the liquor until it is dry, and there will remain at bottom, eleven ounces six drachms of a white salt; keep it in a Viol, it is both a good Aperitive, and Laxative, it is good for Cachexies, Dropsies, and all diseases that proceed from Obstructions: the dose is from ten grains to two scruples in broth, or some proper liquor.

Remarks.

This Operation is nothing but a dissolution that the Salt of Tartar has made of Cream of Tartar, so that it can dissolve in cold water, which it could not do alone; the Cream of Tartar also being an acid insinuates into the pores of the Alkali salt, and sweetens it.

If you boil Cream of Tartar in water, and put into it some salt of Tartar, there will happen an Effervescency between them, but if you mix these two ingredients together in cold water, there will be no Effervescency; the reason of which is, that the acid Spirits of Cream of Tartar being involved in other principles, can have no active power to open the Alkali, unless they be actuated by fire.

I use to filter the dissolution, in order to separate some terrestrious part of the Cream of Tartar, which could not dissolve: this salt comes near in virtue to Tartar vitriolated, some do call it a Vegetable salt.

Chaly-

Chalybeated, or Martial Crystals of Tartar.

This Preparation is a *Crystal* of *Tartar* impregnated with the more soluble part of Iron.

Powder and mix a pound of good white Tartar, and three ounces of *Rust of Iron*, boil this mixture in an Iron pot with five or six quarts of water, for half an hour, or so much time as is requisite to dissolve the Tartar, pass the liquor hot through a warm cloth, then let it settle in an Iron or earthen pot ten or twelve hours, it will shoot into brown Crystals, at the sides and bottom of the pot, pour off the liquor by Inclination, and gather the Crystals; then evaporate about half the liquor in the same pot, let the remainder settle, and take out the Crystals as before; continue these Evaporations and Crystallizations, until you have drawn all your Tartar, dry the Crystals in the Sun, and so keep them.

They are a good remedy for Obstructions of the Liver, Mesentery, Spleen; they are given in Cachexies, and for Melancholy, and the Quartan Ague; the dose is from fifteen grains to two Scruples in broth, or some other liquor proper to the distemper.

Remarks.

This Preparation is boil'd but little, that the Tartar may dissolve only the more Saline part of Iron; the liquor is made to pass through a cloth,

F f 3 to

to free it from the Impurities of the Tartar and Iron which could not dissolve; but you must pass it very hot, for if it were a little cool, the Tartar would Coagulate in the cloth, and so none of the liquor would pass.

Instead of Crystallizing the dissolved Tartar, you may evaporate all the liquor, and so obtain a brown powder, which has the same virtues as the Crystals.

When you would exhibit this *Chalybeated Crystal of Tartar*, you must make it just boil in the liquor you give it in, for otherwise it will not dissolve, and you must be sure to give it as hot as they can take it, for fear it should Crystallize at the bottom of the Cup.

Soluble Tartar Chalybeated.

Put into an earthen pan, or glass vessel four ounces of *Soluble Tartar*, and sixteen ounces of *Tincture of Mars* prepared according to the description that I have given, set the vessel in sand, and with a small fire evaporate the liquor, until there remains a black powder, shut it in a viol well stoppt, and keep it, you'll have eight ounces.

This *Martial Tartar* has the same virtues as the *Tincture of Tartar*, it is good to remove all Obstructions, wherefore it is very properly used in Cachexies, Dropsies, retention of the *Menses*, in Nephritick Colicks, and in difficulties of Urine: the dose is from ten grains to half a drachm, in broth, or some proper liquor, or else made into Lozenges.

Remarks.

Remarks.

This Preparation of *Chalybeate*, or *Martial Tartar* is not only more convenient for use than the former, (in that it dissolves, or mixes in a cold liquor) but has much more virtue in it, for the *Tincture of Mars* contains only the more saline part of *Tartar*.

Soluble Emetick Tartar.

This Preparation is a *soluble Tartar* impregnated with some portion of *Glass of Antimony*, which renders it *Emetick*.

Put into a glass vessel four ounces of *Crystals of Tartar* powdered; pour upon it *Spirit of Urine*; until it be two fingers above the matter, there will happen a small ebullition, because the *Cream of Tartar* will dissolve in the *Spirit of Urine*; when the dissolution is finished, add to it an ounce of the *glass of Antimony* finely powdered, and eight or ten ounces of water; boil it all in a sand-heat seven or eight hours, and take care to put more hot water into the vessel, as the liquor consumes; after that filtrate, and evaporate gently in sand all the liquor, and there will remain three ounces of a greyish powder drawing towards white, keep it in a Viol well stoppt. It is an Emetick that works with little violence; the dose is from four to fifteen grains in broth.

Remarks.

The Ebullition which happens in this Operation, proceeds from the *Cream of Tartars* meeting with the Volatile and Alkali Salt of Urine; for the Acid of *Tartar* piercing the Salt of Urine divides its parts, and gives vent to igneous bodies which were contained in it, and which now finding themselves free do break forth in great haste.

Volatile Spirit of *Sal Armoniack* may be used instead of that of *Urine*; but then there will be no sensible Ebullition, the reason of which is, because the salt of this Spirit is not an Alkali so open as the *Spirit of Urine*, by reason of some impression it has of the *Acid sal Armoniack*, with which it was mixt; insomuch that the *Crytals of Tartar* whose acid is not separated from the Earth, has points too gross, and too unactive to insinuate, into the pores of this salt, and separate its parts so easily as those of the salt that is contained in *Spirit of Urine*, whose pores are bigger.

Some part of the *Glass of Antimony* dissolves in the boiling, and gives the Emetick quality to the powder. It is a very gentle Vomit, because the *Tartar* fixes, and in some measure hinders the activity of the Sulphurs of *Antimony*.

If instead of making the aforesaid evaporation, you should take the vessel off the fire, when there is but two thirds of the liquor consumed, and let it settle without stirring it, in four and twenty hours the soluble *Tartar*, will crytallize at the bottom, and on the sides, but it will be never a whit the better.

When

When you would make this Crystallization you must use a flat vessel, let it be of earth, that the Crystals may display themselves the better. The liquor is to be decanted, and the Crystals to be taken and dried. The evaporations and crystallizations are to be continued, until you have obtained all your salt.

Another sort of *Soluble Emetick Tartar* may be made by boiling in water an ounce of the *Glass of Antimony* powdered with four ounces of *Soluble Tartar*, for seven or eight hours, then upon filtering and evaporating the liquor, there will remain a grey powder of the same virtues as the other, and to be given in the same dose.

Distillation of Tartar.

This Operation is a separation of the Phlegm, the Spirit, and the Oil of *Tartar*.

Fill two thirds of a Retort with *Tartar* grossly powdered, place your Retort in a Reverberatory Furnace, and fitting to it a large capacious Receiver, begin the distillation with a very small fire for three hours only to warm the Retort, and drive out the Phlegm drop by drop; throw away this insipid water, and refitting the Receiver, Lute closely the joints, encrease the fire by little and little, and you'll see Spirits fill the Receiver with Clouds; continue it that the Oil may likewise come forth; then when there will come no more, let the vessels cool, and unlute them; pour that which is in the receiver into a Tunnel lined with brown paper, that the Spirit may filtrate,
and

and separate from the thick black Oil that remains in the filter: keep this Oil in a Viol, it is good to smell to in Hysterical vapours: it would be good to rub Paralytical parts with, and for cold pains, but by reason of its abominable smell, it is not used.

Pour the Spirit into a glass Cucurbite, and rectifie it by distilling it in sand, it is good against the Palsie, *Asthma*, and Scurvy, it works by Urine, and by Sweat. It is used in Hysterical maladies, and for the Epilepsie; the dose is from one drachm to three in some appropriate liquor.

You will find in the Retort a black mass, from which a Salt may be drawn, as I shall shew hereafter.

Remarks.

If you have used three pounds of *Tartar* of sixteen ounces to the pound in this Operation, you will draw four ounces of Phlegm, eight ounces of Spirit, and three ounces of Oil; the black mass which remains in the Retort after distillation, will weigh two pounds, or two and thirty ounces, and you will draw from that mass twelve ounces of salt.

Almost all Authors who have spoke of *Tartar* have asserted, that two sorts of Spirits could be drawn from it by distillation, the one very Volatile, the other fixt and acid; wherefore after all had mixed confusedly in the Receiver, they separated the Oil, and added some Alkali, such as Coral, or Crabs-eyes, to that which remained, then they poured it into a Cucurbite, and distilled about

about half the liquor, which they pretended to be a Volatile Spirit; for the acid Spirit remained absorb'd by the Alkali, with the Phlegm in the bottom of the body.

But having vowed never to be led by any Authority which is not founded upon Experience, I have examined the nature of *Tartar* as strictly as possible, and after a great many distillations of it, I could never perceive this Volatile Spirit, which hath been obtruded upon us; all that I could ever find is this, that *Tartar* contains good store of Essential salt, which renders it acid, and that this Salt coming forth by distillation, and mixing with phlegm, doth make all the Spirit that can be drawn from *Tartar*. So that the *Spirit of Tartar* according to the description of these men is only the more Phlegmatick part of the liquor, that is to say, the most deprived of this Essential Salt, because almost all of it doth adhere unto the Alkali body of Coral, or Crabs-eyes, which were added to it. But according to the way I have set down, the Spirit may be drawn as pure as may be, because I do not leave it to mix with the phlegm, which comes out first.

If we do rectifie the Spirit, it is done to purifie it from some Terrestrious parts, which it might have carried along with it in the distillation.

Some thinking to do better than those who rectifie Spirit of Tartar on alkali matters, do instead of those alkalis use biscuit powdered, but they attain their end never the better, for the biscuit does sweeten the acid *Spirit of Tartar* as much as Coral, or Crabs-eyes.

A very volatile and alkali Spirit is drawn from the Lees of wine, I shall speak of it in the Chapter of the Volatile Salt of Tartar, and perhaps it is *this very Spirit* that *Paracelsus*, and *Van Helmont* do boast so much of, and which has occasioned many Authors to write that the *Tartar* does contain a most volatile Spirit.

Fixt Salt of Tartar, and its liquor, called Oil per Deliquium.

Break the Retort which served you for distillation of *Tartar*, and take the black mass you find in it; Calcine it until it becomes white, then put it into a great deal of hot water, and make a *Lixivium*, filtrate it, and pour it into a glass, or earthen vessel, evaporate in a sand-heat all the water, and there will remain a white salt, which is called the *Alkali Salt of Tartar*.

This Salt is Aperitive, it is used for to draw forth the Tincture of Vegetables, and is given for Obstructions; the dose is from ten to thirty drops in broth, or Laxative Infusions.

If you expose for some days in a Cellar this *Salt of Tartar* in a wide glass vessel, it will dissolve into a liquor that is improperly called *Oil of Tartar per Deliquium*.

It is used for Tettars, and to discuss Tumors; the Ladies do mix it in Lilly-water to clear their complexion, and hands.

Remarks.

Remarks.

In these two last Operations I have given you the means of obtaining all that can be got from *Tartar*; but those who have no need of the Spirit or Oil, and would only desire the Salt, may bruise the Crude *Tartar*, and wrapping it up in paper may Calcine it until it turns into a white mass; after which they may draw the salt by a *Lixivium*, as I said before.

I do commonly draw this way four ounces of very white, and well purified salt of *Tartar*, from each pound of red *Tartar*; a little more may be drawn from white *Tartar*, but it is no better than the other.

I have observed that when water is thrown upon the mass of *Tartar* newly Calcined, it heats, much like unslack'd *Lime*, when wetted; the reason of which is the same that I have given, to explicate the Ebullition of *Quick-lime* in water: all the difference is this, that *Tartar* Calcined containing a great deal of Salt, does more easily imbibe water than *Quick-lime*.

Some do Calcine salt of *Tartar* with a little sulphur, to hinder it from dissolving so easily by the air, and to render it the whiter; but this is no good practice because the acid Spirit of sulphur destroys some part of the Alkali; and this does come to happen, by reason that the pores of this Salt by being thus Calcined are not so open as they were, and the air therefore cannot so easily melt it. If you would make Salt of *Tartar*, and other

Alkali

Alkali fixt salts very white indeed, you must Calcine them all alone in a great fire, until they become white, and then purifie them by Dissolution, Filtration, and *Coagulation*. As for their proneness to dissolve, this is natural to *Alkali salts*, and cannot be taken from them, but by destroying their nature.

Nor can I approve the addition of any quantity of *Niter* to the Calcination of *Tartar*, as some do, because the volatile parts of *Niter* being exalted, the fixt do remain, and by their acidity do diminish the virtue of *Salt of Tartar*.

Although the *Salt of Tartar* be tolerably white after the first purification, yet if you do calcine threescore and four ounces of it, and filtrate it as I have said, you will draw still abundance of earthy matter: and if in curiosity you should dry this earth, you would find three ounces and a half of it.

Alkali salts are Aperitive, in that they dissolve those slimy humors which caused Obstructions; and it is for the same reason that *Salt of Tartar* does correct *Senna*, and hinders it from griping, for the substance of *Senna* being viscous, this does rarefie it, and make it work the quicker; it may also serve to dissolve some viscous phlegm that sticks in the guts, which as it is going off, causes griping pains.

The liquor or Oil made *per Deliquium* is only a *Salt of Tartar* dissolved by the moisture of the Cellar, If you would make it quickly, you must dissolve the *Salt of Tartar* in as much Rain water well filtrated, as is needful to turn it into a liquor. It may be used like the former, it cures Tettars, and discusses Tumors, because being an
Alkali

Alkali it sweetens the keen Salts which fomented these distempers.

When *Salt of Tartar*, or its liquor is dissolved in water newly distilled from some green plant, the water will turn green, and the greener the plant is from which the water was distilled, this salt does make the water so much the greener. The water of Night-shade turns greener with it than Balm-water, Balm-water greener than Eye-bright-water, and so of the rest. The reason of this effect proceeds from this, that the Alkali salt of *Tartar* does rarefie, and make appear many little parts of the plant, which did rise with the water in the distillation, and did not till then appear. But the water must be sure to be distilled with a fire sufficiently great, for if it should have been distilled in a *Balneum*, or such like heat, there would not appear the least shew of green, though an Alkali salt were mixed with it.

Cherry-water, *Rose-water* and many other distilled waters of fruits or flowers, do give no colour, by the addition of *Salt of Tartar*.

Tincture of Salt of Tartar.

This Operation is an exaltation of some parts of *Salt of Tartar* in Spirit of wine.

Melt in a good Crucible twenty ounces of *Salt of Tartar* in a great fire, and when it is in Fusion, cover it with a Tile, and put coals round it; blow about it so, as to raise a greater heat than if you were melting Gold; continue this degree of fire about six hours, or until your *Salt of Tartar*

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is of a red marble colour, which you may know by thrusting the end of a *Spatula* into the Crucible, for when it is drawn out, you may look upon a little matter that is stuck to it; then take out the Crucible with a pair of tongs and turn it upside down into a warm mortar, the matter will coagulate in a little time, powder it presently, and put it into a matrafs warmed before-hand; pour upon it *Spirit of wine Tartarized*, until it swims four fingers above the matter: stop the matrafs with another to make a double-vessel, lute the junctures close with a wet bladder, set your matrafs in Sand, and heat it with a gradual fire, to make the *Spirit of wine* boil seven or eight hours, during which time it will assume a red colour. After that let the vessels cool, and unlute them; separate by Inclination this most fragrant *Tincture*, and keep it in a Viol well stoppt.

You may pour more *Spirit of Wine* on the remaining *Salt of Tartar*, and proceed as before, as long as it will draw out any *Tincture*.

The *Tincture* of the *Salt of Tartar* is an excellent *Apèritive*, it purifies the blood, and resists malignity of humors. It is used in the Scurvy, the dose is from ten to thirty drops in some convenient liquor.

Remarks.

You must place the Crucible in the furnace upon a Tile, for fear lest the wind which comes through the doors of the Ash-hole, and fire-room, might be apt to cool the bottom, and hinder the Fusion of the Salt.

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The *Salt of Tartar* having been a good while melted in the Crucible, does flame when thrown upon lighted coals, as easily as *Salt-peter* does. This effect proceeds only from this, that the fire has attenuated and volatilized the parts of this fixt salt, so as to render them fit to exalt with the sulphur of coals.

Many have writ that it is sufficient to Calcine the *Salt of Tartar* two hours in a violent fire, or until the *Salt of Tartar* becomes blewish; but after having tried several times to make the *Tincture* according to this description, I could never be able to do it; it is true the *Spirit of Wine* will be a little Tinctured, but it comes not near that which is necessary to call it the *Tincture of Salt of Tartar*; for it should be red like wine, and to make it so, it is requisite to Calcine it as I have said, and good store of it should be put into the Crucible, because it diminishes exceedingly. You must likewise take care to use *Spirit of wine well rectified*, for if there should be any phlegm in it, it would not turn red.

This *Tincture* doth not proceed from a fixt sulphur contained in the *Salt of Tartar*, as many have pretended; it is only an exaltation of this salt in *Spirit of Wine*; for if by way of curiosity you should distil this *Tincture*, you would recover only a *Spirit of Wine*; and yet nevertheless there will remain at bottom but a small quantity of *Salt of Tartar* with its usual whiteness; which shews sufficiently that this colour did only proceed from the exact mixture of the *Spirit of Wine* with the *Salt of Tartar*, seeing upon their separation the colour disappears.

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The *Tincture* of the *Salt of Tartar* loses its red colour as it grows old, by reason that the more subtile part of the *Spirit of wine* is lost through the pores of the glass, and there remains only a *Spirit* which has not strength enough to keep the *Salt of Tartar* in its exalted condition.

Magistery of Tartar, or Tartarum Vitriolatum.

This Operation is a *Salt of Tartar* impregnated with the acidity of *Spirit of Vitriol*.

Put into a glass body what quantity you please of *Oil of Tartar* made *per Deliquium*, pour upon it by little and little rectified *Spirit of Vitriol*, there will be a great effervescency: continue to drop more in, till there's no further Ebullition; then place your Cucurbite in Sand, and evaporate the Spirit with a little fire, there will remain a very white salt, keep it in a Viol well stoped.

It is a good Aperitive, and is also a little Purgative; it is given in hypochondriacal cases, in Quartans, Kings-evil, and all other diseases wherein it is necessary to open Obstructions, and to work by Urine. The dose is from ten to thirty grains in some proper liquor.

Remarks.

Tartarum Vitriolatum may be made with the *Salt of Tartar* as well as with the *Oil*; the Ebullition

tion proceeds from this, that the acid of Vitriol piercing the Alkali Salt of Tartar, doth violently separate its parts, and gives vent to igneous Bodies which were there imprisoned; and this Effervescency comes to pass as often as an Alkali meets with an acid, and remains until the acid can find nothing more to encounter in the alkali salt. Then there follows a *Coagulum* at the bottom of the vessel, because the acid and alkali clasping together, do lose their motion, and by their united weight do precipitate to the bottom. And this causes the liquor to be much less acrimonious than the Oil of Tartar was before, though at least an equal quantity of Spirit of Vitriol was mixed with it. You must evaporate it gently, and especially toward the end, for fear the acid should rise withal.

This Salt is whiter than common Salt of Tartar, as having been subtilized by Acids, after the same manner as we see several other white things encrease in their colour, as they are beaten into a fine powder.

If you do use two ounces of Salt of Tartar in this Operation, you'll draw two ounces and a half of *Tartarum Vitriolatum*. This Augmentation comes from the more heavy and strong part of the Vitriol, for that which is evaporated is very phlegmatick.

You may here use the Rectified Oil of Vitriol instead of the Spirit, and then the less is requir'd, because it is a stronger acid, but the *Tartarum Vitriolatum* will not be so white, as when Spirit of Vitriol is used, by reason of some Tincture that always remains with the Oil of Vitriol, rectifie it as much as you please.

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Though some have written, that if *Tartarum Vitriolatum* were put into a Retort, and distilled, one might draw *Spirit of Virioli* as good as it was at first, nevertheless it is certain that it will not be so strong a *Spirit*; for it has lost the most subtile part of its acidity, by encountering with the alkali, which may be easily judged both by the taste, and the effects.

If by way of curiosity you would search a little narrowly into this Operation, and observe what happens during the ebullition of the acid and the alkali, you would find, that a great many little dashes of water do fly about, especially if the vessel is not placed too low, and you hold a lighted Candle near it, for they will be apt to put it out. This effect can have no other cause than the violent separation of the parts of the alkali by the acid, which makes the watry part of this liquor to sparkle upwards, being on all sides violently driven.

If you use *Oil of Virioli*, the ebullition is the greater, and the heat the more considerable, because its acid being stronger, it separates the parts of the alkali body more easily.

Now considering the ebullition which happens between acid and alkali, I have the less opinion of a method that some do follow, which is to bathe a little the bodies that are to be embalmed, with *Spirit of salt*, and then to put *Salt of Tartar* into the embalming powder; for it is very likely, that this *Spirit of Salt*, which is an acid, by mixing with the alkali salt of *Tartar*, may produce a Fermentation which may stir up the remaining humidity of the Carcass, and make it to mix with the Ingredients

gredients of the powder, and so instead of preserving the dead body, we have reason to fear lest this Fermentation should rather hasten a dissolution of its parts.

Acids do sometimes dissolve and rarifie, and at other times coagulate and precipitate, as may be seen by the Operations which have been described. These different actions do seem very strange, for it is hard to conceive how one and the same liquor should produce contrary effects ; but I'll give you an explication of this *Phenomenon*, which because it is built upon experience, may perhaps meet with some Approbation.

An Acid proves always a dissolvent, when good store of it is poured upon the matter that is to be dissolved ; but it makes a *Coagulum* as often, when being in too small a quantity its points are fixed in the pores of the matter, and have not power enough to get out ; and this is plainly perceived, when *Spirit of Vitriol* is poured upon the liquor of *Salt of Tartar* ; for if you should mix but so much as is requisite to penetrate the Salt, the acids do remain sheathed in it, and bear it down, whence a Coagulation and Precipitation happens ; but if now so much more, or a greater quantity of *Spiris of Vitriol*, should be still added to the liquor, the *Coagulum* will disappear, by reason that the little bodies which being gathered together maintained their part against the acid, and hindered its motion, will be then scattered and dissolved by the acid, that is now grown the stronger.

The same thing may be remarked in all other bodies which can be dissolved by acids ; for if you take a little of any of those, and pour a little acid

G g 5 upon

upon it, there is made a great effervescency, and after that a *Coagulum*, but if you add more acid, the matter will all dissolve.

An acid can likewise Precipitate what an alkali hath dissolved, as we see in the Operation of the Magistery of Sulphur, and this because the acid having dissolved and separated the parts of the alkali makes it let go its hold, and the body precipitates by its own weight.

When Milk coagulates by the means of an acid, it is because it contains a great deal of Cheese, into which the acid enters, and losing its motion weighs it down; whence it comes to pass that the *Coagulum* which is made with a weak acid, precipitates much less than that which is made with a greater quantity of acid; but if you should in curiosity pour a great deal of acid upon the precipitated *Coagulum*, you would find it dissolve by degrees.

The fermentation of Dough, and other matters of the same nature does proceed from this, that the natural salts having been put into motion by trituration or some other cause do rarify and dissolve, as much as they can, whatsoever resists their motion; but because these acid salts do exert their activity by little and little, and do meet with much resistance, the solution is made slowly, and the division of some parts is with difficulty enough. And this is that which causes the matter to swell as it does, and to take up greater room than it had before.

Leaven does encrease the fermentation in dough, because it self being a paste whereof the salts are become free to act by means of a long fermentation, these

these salts do easily join with those of the other paste, or dough, and do help them to rarifie and dissolvé the whole.

The same may be likewise said of other acid matters which cause a fermentation.

But when the acids have rarified the matter as much as they are able, they lose their motion in it, and then the matter coagulates, that is to say, returns into the same extension as before.

There is still one effect of acids, which seems different from those I have now spoken of, that they do preserve certain bodies which are put into them, as salt keeps or preserves meat. Thus when young Cucumbers, Samphire, or Capers are steeped in Vinegar, there is no fermentation with them, and consequently no corruption.

The reason of which is that the parts of Cucumbers and other like things being very viscuous and sluggish, the acids do insinuate to dissolve them, but they have not there their motion free enough to make their jostles, and to divide the parts minutely, so that the acids of the Vinegar do only fix in the pores of these matters and coagulate in them.

It is this coagulation which hinders the Cucumbers from corrupting, for these acids do shut their pores, and serve for so many little pegs, wherewith to sustain their parts firm and quiet. Sea-salt which is an acid does preserve meat, and many other matters, for the same reason. I have already spoken of that in my Remarks upon the Principles.

The Coagulation then which acids do cause may justly be said to be an imperfect dissolution of

bodies, and I could here relate a great many other Examples to prove what I have asserted. But I shall content my self with those already said. And now let us see whether this discourse can furnish us with any thing that illustrates the digestion of Aliments in the Stomach.

Most of our modern Philosophers have not spared the notion of acid, when they have endeavoured to explicate digestion, they have conceived the Membranes of the Stomach to be all impregnated with it, and many of them not contented with this liquor alone have brought some more of it from the Spleen and *Pancreas*: but if all these acids were really in the Stomach, the aliments would not escape coagulating, and consequently an Indigestion, as uses to happen, after taking too many acids at Meals; for conceive never so great a quantity of them, either there would not be enough to dissolve the Aliments, or else the Membranes of the Stomach would be attenuated and concocted too, as well as that which they contain, which nevertheless doth not happen in the natural temper of the body.

There is no need of seeking after these imaginary acids to cause digestion; the spittle which mixes with the Aliments as they receive their first Trituration between the Teeth, will furnish us with enough to actuate the Fermentation in the Stomach; there is but little acid requisite to set the parts in motion, but when once they are moved, they do contain enough Salts and Spirits of the same nature, which being quickned by the heat of this *viscus* will break all their Chains, and find a vent out, whence does infallibly follow
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an attenuation of the Aliment into a Chylous substance.

It will be said, without doubt, that the irritation in the Stomach, which is called *Hunger*, cannot be produced by any thing but an acid, which finding no more Aliments to work upon, uses to act upon the Membranes themselves. But I think I shall explicate this Irritation better, according to my own opinion, than that of these men; for I may with reason enough say, that the spittle finding the stomach empty of all nourishment, ferments alone, and creates this Irritation, seeing that spittle, as every body must grant, is loaded with a Salt; but as for them, they must make an acid to come from the membranes, which nevertheless doth not irritate them, but only when it meets with nothing else in the Stomach to exercise upon, which is a thing hard enough to comprehend.

I know very well that some of them to avoid this difficulty will say, that the acid is generated in the stomach from the remainder of that which is eaten, which continuing some time in the stomach produces a Leaven after the same manner as Dough; but then they must explain to me what the Ferment did consist of, which served to digest the first Aliments that the Infant took.

Another Objection may be made to what I have said touching digestion; it is, that whereas I have maintained that acids do dissolve when they abound, and Coagulate when they are but few in a great deal of matter, it should happen that Spittle should then be apter to Coagulate the Aliments in the stomach, and cause indigestion, than would a greater quantity of acids, for it seems, according

according to my discourse, the more acids are found in a matter, the more liable it must be to dissolve.

To resolve this difficulty, which seems to be very considerable, we must observe, that the natural acids of Aliments taken into the stomach, are sufficient to rarifie and dissolve those bodies which hinder their motion, when it has been begun by Mastication, or by some salt of the spittle, which serves as a Leaven to them, much after the same manner as the salts of meal do rarifie the Paste, when they have been actuated before by Trituration and Leaven together; but now if there happens to be too much acid in the Aliments that are taken into the stomach, they will have the same effects as Cucumbers and those other things I mentioned, which are preserved in Vinegar. The acids will indeed endeavour to cut in pieces what stands in their way, but having to do with parts too viscous and heavy, they will soon lose all their activity, and fix by their quantity, and their gravity the natural salt of these Aliments, as Vinegar fixes that of Cucumbers; for when the acids do shut the pores of the matter, and keep them firm and quiet, the natural salt cannot exalt so as to cause any Fermentation or digestion.

The reason then why a small portion of acids will cause digestion in the stomach, and a greater quantity will hinder it, is that the small quantity will joyn with the natural salt of the Aliments, and have its operation without shutting the pores of the matter, whereas a great store of acids will quite fill the pores of this matter, and hinder the motion of the natural salt; for it is not enough

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that there be a great many acids, to cause such a dissolution, these acids must have room to move in, and to make their jostles.

Thus these effects do make nothing against what I have asserted concerning acids, for a greater quantity of them will always have more disposition, and tendency to a dissolution; but if this great quantity does Coagulate divers things, it is only by accident, and through the disposition of the matter into which the acid points have entred.

What I have here established concerning acids may serve very much to explicate the nature of Feavers, and their principal symptoms.

First of all every body must grant, that when there are Obstructions in our bodies, the obstructed matter does ferment and sower, as Dough, Wine, and several other things grow sower by being stale.

This matter by Fermenting sends saline or acid vapours into the mass of blood, which do cause divers alterations in it, according to their quantity, and quality, for these acids are commonly mixt with sulphurs, which are a kind of Vehicle to the acids, and are more or less corrupted, according as the matter whence they are derived has sojourned more or less in the obstructed part.

Now if these acid vapours are carried into the vessels, but only in such a quantity as is fit to make a kind of Leaven, they will then rarifie the blood too much, and whereas they by consequence do encrease its motion and heat, they do cause that which we call a Fever; this Fever must remain as long as the Ferment continues in the blood, and according as there comes a new supply of matter
in

in place of that which nature has thrown off.

But if a greater quantity of acids should rise all of a sudden from out of the Obstructions, then there must needs happen a kind of *Coagulation*, for these acids thus abounding, and fixing the grosser part of the blood, do partly lose their motion, and quiet the Ebullition of the blood by fixing its parts.

It is this kind of Congelation which causes those cold shiverings, which are felt, before the hot fit begins; for as the heat is derived from the motion of the Spirits, the cold is produced from the cessation of their motion.

The cold fit continues until the Spirits have by their activity rarified this Congelation; for the Spirits being continually supplied with additional forces do make violent assaults until they have made their way free.

The *Coagulum* being dissolved, the blood should seem to Circulate as it did before, but because the matter of the *Coagulum* is converted into a Leaven, this Leaven makes the blood to boil, and so causes a Feaver; this Feaver continues until the blood is freed from all this Ferment, either by Transpiration, or by Urine.

Now to conceive how this *Coagulum* may be converted into a Leaven, we must consider that the Spirits of the blood have lost most of their acidity in dissolving this *Coagulum*, and that there remains but only acidity enough to produce a Fermentation.

Nevertheless you must not think I mean by this Congelation now spoken of, a *Coagulum* altogether like to that in Milk, or to that which happens, when an acid liquor is syringed into the Veins of an

Ani-

Animal, for these Congelations are too strong, and there would then happen the same thing, or very near the same as does to the Animal, who soon afterwards falls into Convulsions, and dies, because the course of the Spirits and blood would be intirely stopt, and they would never be able to break through so great an obstacle: but I do understand here that the blood is made thicker than it was, and has not so free a motion as it had before, which is enough to cause such cold fits.

Now it remains for me to explicate how it comes to pass that Feavers have their returns regularly by fits.

The matter that makes the Obstructions which I have laid down for the Fundamental cause of Feavers, begins not to send forth its vapours, nor to disperse its acid salt into the blood in order to cause a Feaver, until it has got together a certain quantity in the obstructed vessels, and then it is probable that there is a new discharge of the matter.

This discharge or eruption of Feaverish matter must happen at set times, so long as the Obstruction lasts, because the humors which Circulate to the obstructed parts, and there stop, are always in an equal quickness and an equal quantity.

Now because in a Tertian, the vessels wherein the obstruction happens, do acquire in two days a sufficient repletion of matter to produce the Eruption and Fermentation I have spoken of, the Fits do come to operate every second day.

But because in a Quartan the humors are more tenacious and heavy, and flow with less expedition, the Fermentation and eruption must needs be slower,

flower, and consequently the fits more distant the one from the other.

The Quotidian Ague is caused by a *Saline Pituita* which is naturally fluid enough to make the matter ferment in less time, wherefore it is that the fits do return every day.

We may reason concerning the other kinds of Feavers upon the same principle, and explicate all the accidents that happen, but I have no design to enlarge my self further upon this subject, I should think it would be too great a digression, and a book should rather be made on purpose, to express all the circumstances which might be deduced from it.

Volatile Salt of Tartar.

This Operation is the Salt of the Lees of Wine, volatilized by fermentation.

Dry the Lees of wine with a gentle fire, and fill with them two thirds of a large earthen or glass Retort, place this Retort in a Reverberatory Furnace, and fitting to it a large Receiver, give a small fire to it to heat the Retort by degrees, and to drive forth an insipid phlegm; when vapours begin to rise, you must take out the phlegm, and luting carefully the junctures of your vessels, quicken the fire by little and little, until you find the Receiver filled with white clouds; continue it in this condition, and when you perceive the Receiver to cool, raise the fire to the utmost extremity, and continue it so, until there rise no more vapours. When the vessels are cold, unlute the Receiver,

Receiver, and shaking it about to make the Volatile salt which sticks to it fall to the bottom, pour it all into a Bolt-head; fit to it a Head with a small Receiver; lute well the junctures, and placing it in sand, give a little fire under it, and the Volatile salt will rise, and stick to the head, and the top of the Bolt-head; take off your head, and set on another in its place: gather your salt, and stop it up quickly, for it easily dissolves into a liquor; continue the fire, and take care to gather the salt according as you see it appear; but when there rises no more salt, a liquor will distil, of which you must draw about three ounces, and then put out the fire.

This salt is in great request for to purifie the blood, by sweat or urine: it may be given in the Palsie, Apoplexy, Epilepsie, Quartan and Tertian Agues, and to open Obstructions; the dose is from six grains to fifteen in some proper liquor.

The distilled liquor is a Volatile salt that is risen with the phlegm; it is called the Volatile Spirit of *Tartar*, and has the same virtues as the salt; its dose is from eight to four and twenty drops.

After this same manner the Volatile salt of *Beans*, *Soot*, and divers *Fruits* and *Seeds* may be prepared.

Remarks.

The Lees of Wine being incomparably more Fermented than the *Tartar* which is found in the sides of vessels, we need not wonder if its salt is more Volatile.

This

This salt is sublimed in a Bolt-head, to the end the phlegm, which is too heavy to rise easily so high, may not mix with it; but it is extraordinary hard to keep this salt dry, it easily humects and dissolves into a liquor, wherefore it were much better to draw it in a Spirit, and less of the Volatile part would be lost, being detained by the phlegm.

Nevertheless because there are several persons who are as well pleased with the sight of things, as their effects, this liquefied salt might then be mixt with a sufficient quantity of Calcined bones powdered, to make thereof a Paste, which might be made into little Pellets, to be put into a Bolt-head, and fitting to it a Blind-head, this salt may be sublimed or rectified as before, and this *pure salt* must be kept in Viols well stoppt.

The difficulty there is in keeping this Volatile salt dry, as well as that of other Vegetables, does proceed from this, that only the more essential part is volatilized, for there remains much fixt salt with the earth in the Retort.

This volatile salt becomes alkali by the means of fire, as other volatile salts do, whereof I have already spoken in my *Remarks* upon the Principles; and there is no manner of probability that it should have been of this nature, either in the *Plant* or in the *Lees*, for the reasons that I have shewn in the same *Remarks*.

I shall add here, that if the alkali salt did exist in the *Lees*, but is not able to expand it self, and get the predominancy of acids but only by a long Fermentation, as the Chymists will have it, who follow the common way of discoursing of these things,

things, it would then necessarily follow that the more Lees do ferment, the more they must lose of their acidity, because the alkali would destroy it. Nevertheless the contrary to this happens; for Lees do sour as they grow stale, & those who make Vinegar, do know well enough how to use the Lees, and to make them ferment with their wine, when they would make Vinegar quickly.

It seems to me from the consideration of this effect, that there is little reason to follow the Sentiments of some, who have writ that the Lees of wine abounding in volatile salt, and a sulphureous spirit do contain but very little acid; for it is as plain as may be that this volatile salt is acid in the Lees, and is the same that makes the acid spirit of Vinegar, being more volatile than many other acids, to volatilize with its phlegm in the distillation. It is true that salt of Tartar drawn by the Retort, does rise more easily than Spirit of Vinegar, but this is from its being volatilized by the violent heat of fire.

Another mark that all the salt of Lees is acid, is this, that the *Tartar* does all dissolve in the wine, and turns into Vinegar; for very little or no Lees, or other *Tartar*, is to be found in the vessels wherein Vinegar is made, although there was some naturally before, or though some more were added to it as I have said in the Chapter of Vinegar.

Perhaps it will be objected, that Lees are sometimes added to wines grown ropy and mucilaginous, to make them good again, and yet those wines are not soured by the Lees.

H b

But

But this effect happens, when the former Fermentation becoming imperfect, through the too great quantity of phlegm for the little proportion of salt that was in the wines, the salt of the Lees does rarifie, exalt, and conjoin with the Oily parts of the liquor that the Spirit of wine is made of, as I have said in the Chapter of Wine.

For the wine does not fowr, so long as the salt finds Oil to act upon, but it does so, when this salt finds nothing to hinder it from expanding itself.

The volatile salt of Tartar produces much the same effects, as that of *Beans*, and other seeds, and though many will needs give it sublime and extraordinary virtues in comparison with other volatile salts, I do'nt see any reason for such high conceits, nor that effects do answer their pretences.

Volatile salts have a good use, when they find the pores & humors disposed for perspiration, but they are full as dangerous, when the humors are not at all prepared; for by their volatility they do put the humors into so great a motion, that oftentimes the Feaver is encreased by them, and a translation made to the Brain: wherefore you must consider well the Temper and present state of your Patient, before you presume to give them.

That which remains in the Bolt-head, after the volatile salt, and spirit are drawn off, is a black and stinking Oil mixt with the more phlegmatick part of the liquor; you must separate this Oil in a Tunnel lined with brown paper; it is good for the Palsie, for Cold pains, and for Hysterical women to smell to.

A *Lee* or *Tartar Calcined* is found in the *Retort*, out of which you may draw a fixt alkali salt, as out of common *Tartar*, but in a much less quantity, for that the greatest part of the salt of *Lees* is volatilized.

CHAP. XV.

Of Opium.

O *Opium* is a Tear, which distils of itself, or by Incision of the heads of *Poppies*, found very frequently in *Greece*, in the Kingdom of *Cambaia*, and the territories of *Grand-Cairo* in *Egypt*: there are three sorts of it, the Black, the White, and the Yellow.

The Inhabitants of those Countries do keep this *Opium* for their own use, and do send us only the *Meconium*, which is nothing else but the *Juyce* of these same *Poppy-heads*, drawn by expression, and then thickned, and wrapt up in leaves to transport the better. It is this Drug that we improperly call *Opium*, and always use for want of the true; but being more impure than the true, it hath not the same activity, and strength.

A *Meconium* may be made after the same manner with the heads of those *Poppies* that grow in *Italy*, *Languedoc*, and *Provence*, but it will prove much weaker than the former.

H h 2 The

The *Opium* which comes from *Thebes*, or else from *Grand-Cairo*, is accounted the best, you must choose it Black, Inflammable, bitter to the taste, and a little acrimonious, its smell must be disagreeable and stupefactive.

Extract of Opium, called Laudanum.

This Operation is the purer part of *Opium* drawn in water and Spirit of wine, and reduced to the consistence of an extract.

Cut into slices four ounces of good *Opium*, and put it into a bolt-head; pour upon it a quart of Rain-water well filtred; stop the bolt-head, and setting it in sand, give your fire by degrees, then increase it, to make the liquor boil for two hours, strain it warm, and pour it into a bottle.

Take the *Opium* which remains undissolved in the Rain-water; dry it in an earthen pan, over a small fire, and putting it into a Matrafs pour upon it *Spirit of wine* to the height of four fingers; stop the Matrafs, and digest the matter twelve hours in hot Ashes; afterwards strain the liquor, and there will remain a glutinous earth which is to be flung away.

Evaporate both these dissolutions of *Opium* separately, in earthen or glass vessels, in a Sand-heat, to the consistence of honey, then mix them, and finish the drying this mixture with a very gentle heat, to give it the consistence of Pills, or a solid *Extract*.

It is the most certain Soporifick that we have in Physick, it allays all pains which proceed from too great

great an activity of the humors, it is good for the Tooth-ach, applied to the tooth, or else to the Temple-artery in a plaister, it is used for to stop spitting of blood, the bloody-flux, the flux of the *menfes* and hemorrhoids, for the colick, for hot defluxions on the eyes, and to quiet all sorts of griping pains: the dose of it is from half a grain to three, in some convenient Conserve, or else dissolved in a Julep.

Remarks.

Opium is compounded of a Spirituous part and a gross terrestrious Rosine; the Spirituous part may be easily dissolv'd in water, but the Resinous requires a more convenient *Menstruum*, such as *Spirit of Wine*. You must dry the *Opium* after the first dissolution, least the *Spirit of Wine* be too much weakned by the watry part that remains, which would hinder the solution from being done so well as it should be.

Distilled Vinegar dissolves *Opium*, but the acids may diminish its virtue, by destroying or fixing its volatile part, which serves for a vehicle to the other.

Spirit of wine alone might be used to dissolve both parts of the *Opium*, but it might be feared it would carry away with it the volatile part in the Evaporation.

All that is in the *Opium* is preserved by my description; for the Resinous part dissolved in the *Spirit of Wine* cannot evaporate with it, because it is the heavier; and the other part which I call Volatile in comparison with the first is mixt with a little Rosine that keeps it back, while the water evaporates. The truth of this I have found by experience, and any body else may try as well as I

have done, by distilling these liquors. Lastly it is hard to use any greater precaution than this, for the preservation of all the pure parts of *Opium*, and fewer *Menstruums* can be used that are more convenient.

If in curiosity you weigh the glutinous earth after it is dried, you will find it to be half an ounce.

Almost all Authors have appointed to torrifie *Opium* before it be dissolved, to the end a certain malignity which they say is in it may be evaporated; but that which they call malignity is nothing but the Spirits, or Sulphurs that are most volatile, whereof I spoke but now; so that by the Torrefaction they deprive it of its more active part. They do further add to the *Extract* commonly drawn with *Spirit of Wine*, Coral, Pearl, Treacle, *Extract* of Saffron, Cordial Confections, Hysterical ingredients and other things which may resist a cold malignity in the fourth degree which they pretend to be in *Opium*. But experience convinces us that it is not so dangerous, when given in the foresaid dose, so that there is no need at all of losing its volatile part by Torrefaction, nor of mixing it with other ingredients which may hinder its operation, or retard its effect. It belongs to the Physician, when he thinks fit to give it, to judge whether there be any need of an Hysterick, or Cordial, which he may appoint to be mixed upon the spot.

I shall not stay to examine here whether *Opium* is cold or hot; they who have made the Anatomy of this mixt, do know very well that it is almost all of it Sulphur. I shall endeavour to explicate its effects the most sensibly I can according to the Rules of Chymistry.

The

The virtue of *Opium* consists in causing sleep, and that by calming the motion of the Spirits; for since watchfulness does proceed from the motion of the Spirits, which by rarifying the humors in the little passages of the Brain do augment their Circulation, it may surely be said with probability enough that sleep is caused by some condensation of the humors, which happens from a repose of the Spirits in the Brain. According to this Principle then there must be contained in *Opium*, and all other Soporificks, a certain substance that inviscates the Spirits, and hinders them for some time from Circulating so fast as they did before. Let us examine now, whether any such thing can probably be found in *Opium*, by the *Analysis* I have made of it: first of all I have observed a Spirituous part, but after that hath been drawn out by means of Rain-water, there remains a gummous and terrestrious matter, and this is the substance that I find so proper to produce this effect. For nothing in Physick is so fit to thicken the blood, and other humors, as things that are Mucilaginous: Milk, and the Emulsions which are drawn from divers feeds, the Water-Lily, Lettice, nay and all temperate Aliments, do frequently incline to sleep, because they are impregnated with a gummous substance, which mixing in the blood, does serve to agglutinate the Spirits, and to moderate the quickness of their motion; this now being supposed, it is easie to conceive how *Opium* makes one sleep, seeing it is loaded with Mucilaginous parts, which may be conveyed into the vessels.

But without doubt it will be here objected, that *Opium* is full of subtile parts, which on the contrary

trary instead of condensing the Spirits must needs rarifie them; and further, that according to my discourse all sorts of Gummous matters should incline to sleep as well *Opium*, which is a thing manifestly false.

In the first place, I answer, that the Spirits of *Opium* being actuated by the heat of the Stomach do serve to raise the Gummous part, and to conduct it into the little passages of the Brain, but having there introduced them, they either fly away through their volatile nature, or else condense with the moisture of the Brain. The same thing happens, after drinking any Spirituous liquor, such as Wine, Cyder, or Beer; for the Sulphureous Spirits of these liquors carrying along with them some phlegmatick parts, do conduct them into the little vessels of the Brain, or else do cause some Coagulation there, whence it comes to pass that a man who is drunk commonly sleeps until the Spirits of the liquor he is intoxicated with, are in part spent, or evaporated out of his Brain.

In the second place, I say that all Gummous or viscous things are not able to cause a sleepiness as *Opium* does, because they have not equally the same proportion of volatile Spirits to convey them into the Brain. They may indeed, by giving more consistence to the blood, moderate its motion a little, and excite some disposition to sleeping; but it will not be done so quickly as by the means of *Opium*, and they likewise do it with a great deal less force.

If you should mix volatile Spirits with the Gummous matters I now spoke of, it would not follow that

that they would prove narcotick as *Opium* is, because the Spirits not being capable of so strict an union with those matters, as the Spirituous part of *Opium* has received with its viscous substance, they would soon separate from one another in the stomach, and the gummous matter would want a vehicle to convey it into the channels of the brain, as would be requisite in order to cause sleep.

The viscous parts of *Opium* insinuating into the small channels of the brain, do there produce a condensation or inspissation of the humors, until by little and little new Spirits do draw together, which by dissolving and rarifying this glue, do carry it along with the blood, or other humors. And then it is that the sleeping ceases, a man finds himself awake as before.

Reason may be given why pains in many places are asswaged after the effect of *Laudanum*, for these pains being caused by an agitation of the Spirits, when these Spirits are condensed, the pain consequently ceases. And this *Opium* does perform exceeding well, as I have said.

Those who fall into *Deliriums* in a continued Fever, do find themselves strangely relieved by the use of *Opium*, by reason that the principal cause of this accident is an acrimonious salt, which is got into the Brain, and irritates its membranes. Now *Laudanum* which is a viscous substance, unites with these salts by means of its Sulphur, and takes away their Acrimony. It likewise stops the Dysentery, the Flux of the *menses*, and other Hemorrhagies by sweetning the acrimonious Salts which fomented them.

Lastly

Lastly *Opium* may be said to be one of the greatest Remedies that we have, when it is properly administred, and in a reasonable dose: but when it is given in too great a quantity, it so thickens and glues the humors in the brain by its viscous parts, that the Spirits which come afterwards to succour, not being able to dissolve this viscosity, are forced to stop and congeal likewise by little and little, until at last they lose all their motion, whence it comes to pass that many do dye upon the taking of *Opium*.

It is remarkable, that many do so accustom themselves to the use of *Opium*, that at last it is scarce able to make them sleep, except when they take three or four times as much as is commonly given. There are some men in *France*, who can venture to take to a drachm, and this quantity does no more in them than two grains in another.

It is well known that the *Turks* will take of it to the bigness of a hazle nut, to fortifie themselves when they are going to fight. The reason that they can do so is, that *Opium* passing a great many times into the small vessels of the Brain, hath in great measure dilated them. So that finding the passages very large, it makes little or no stop, unless taken in a greater quantity than before; for the *Turks* do not only accustom themselves to the taking of *Opium* by little and little, but being of a hotter Temperament than we, they supply more Spirits to the Brain for rarefaction of the humors, which *Opium* might there have condensed.

If the *Turks* do find themselves fortified so soon as they have taken *Opium*, it is by reason of these volatile Spirits, which work in them much the

the same effect, as the Spirits of Wine use to do with us.

Some have writ in opposition to what I have establish'd on this subject, and say, that if we have regard to the quantity of Narcotick vapours that may arise from a small dose of *Opium*, it ought not to be imagined that those vapours should be able to shut the channels of the Spirits and humors which make a defluxion upon some part; but that we should rather conclude the mitigation of pains, and stopping of defluxions to proceed from a just proportion of the salt and sulphur of *Opium*, and from the secret ferment they contain.

But this Objection will give us little trouble to answer, when we consider that although the vapours caused by it are but few, yet the vessels of the Brain, in which the Animal Spirits do move, are exceeding delicate, and easie to be obstructed; and that the too great activity of the Spirits, which often fly into the diseased parts, being thus abated by the viscous nature of *Opium*, there must needs follow thereupon some ease and comfort, without any need at all of admitting a stoppage of the vessels which contain the humors.

As for the proportion of salt, and sulphur in *Opium*, and the secret Ferment they pretend to acquaint us with, in order to explicate this matter, I know they are high terms indeed, but illustrate the matter very little, for though they say these salts and sulphurs do unite with *Homogeneous* particles that they meet with, and destroy such as are the cause of the distemper, yet we can never by this means obtain any clear *Idea* of that which makes *Opium* to be soporiferous. Besides

Besides the virtue which *Opium* has to cause sleep, I have observed that it is often Sudorifick. I conceive this effect must not be attributed only to the volatile parts of this mixt, which may be thought to operate this way, after they are disingaged from its viscosity, but rather to this, that during sleep, the inward vessels being as it were obstructed, or in some manner coagulated, and the Spirits finding resistance in their passage, do reflect, or bend their motion to the outward parts, and draw along with them some moisture through the pores. That which confirms me in this opinion is the consideration, that divers persons do use always to sweat, when they are asleep, though they have not taken any *Opium* at all. Now it may happen that in the operation of *Opium*, the Spirits finding more resistance within than they are wont, may tend outwards with the more force, and consequently incline to sweat more than in natural sleep.

Some prejudiced *Chymist* may not relish perhaps this my explication, because I do not season it with salt enough, and *Sulphur*, and other principles; but although the five principles which may be drawn from Vegetables may also be drawn from *Opium*, I never use them but when they are necessary to explicate some effect; for whensoever I find they cannot satisfy my reason, nothing shall hinder me from pursuing my thoughts farther, and searching otherwise for some better explication. In fine the Beauty of Chymistry does not consist in suiting our opinions to those of ordinary Chymists, who resolving to explicate all the Events of nature by their Principles, which they manage according to their own fashion, do
reject

reject as ridiculous whatsoever does not agree with their Sentiments; but it rather consists in examining and imitating what is done Naturally, and so searching for reasons that are most probable, and such as may be said to come nearest to truth, though a man be fain to forsake the way that others have trod in.

C H A P. XVI.

Of Aloes.

A *Loes* is the thickned Juice of a Plant bearing the same name, it grows in many Countries, especially in *Egypt*, whence it is brought to us; the best is that which is called *Hepatick*, and *Succotrine*, because it bears the colour of a Liver, and a great deal of it is brought from an Island of *Persia*, called *Socotra*; the *Hepatick* is drawn by Incisions made on the Plant; it is friable, of an offensive smell, and very bitter taste.

There is another sort of *Aloes*, which doth not differ from the former, but only in that being drawn by expression, many Impurities are mixed with it, it is compact, heavy, and smells not so strong as the other. It is called *Aloes Caballina*, because Farriers do use it most for their horses.

Aloes is not only used inwardly, as I shall shew, speaking of its Extract, but it is also used outwardly

wardly in many Unguents and Plaisters that are deterfiv, and difcutient.

Its Tincture is alfo drawn with Spirit of Wine, by the fame method as I fhall describe that of *Myrrhe*; it is difcutient, deterfiv, good againft Gangrenes, and to Incarnate: it is ufed in Injections to difsolve gypfous humors, and to cleanfe wounds, and old ulcers.

Extract of Aloes.

This Operation is an *Aloes* depurated from fome feculencies which it contained.

Difolve eight ounces of *Aloes Succotrina* in a fufficient quantity of *Juice of Roses*, or a ftrong decoction of *Violet Flowers*; let the diffolution fettle five or fix hours, then decant it, and when you have filtred it, evaporate the liquor gently, until the matter remains in the confiftence of an Extract, keep it in a pot.

'Tis a good Remedy to purge the ftomach, fortifying it withal, the dofe is from fifteen grains to a drachm in Pills; it is likewise good to bring down the *menftrua*.

Remarks.

This Preparation is nothing but a Purification of *Aloes* into an Hepatick liquor. Pills are made of this Extract, and are called *Pills of Frankfort*, and fome do add to them Maflich, Rhubarb, and other Stomachick Ingredients; it is the Basis of the *Angelical Pills*.

Aloetick

Aloetick Pills may be taken at meat, or a little before meals, they seldom purge till the next day. Wherefore they have been called *Pilula ante cibum*. They bring the Hemorrhoids, and Terms, in that *Aloes* do rarefie the blood by its Fermentative Salt, and stimulates it out of the veins with great force.

The *Extract* of *Aloes* taken alone is pungent upon the stomach. It is given immediately before meat, that the aliments by their viscus quality may dull the keen operation of this remedy, and so may serve as a *Corrective* to it.

CHAP. XVII.

Elixir Proprietatis.

THIS Operation is a Tincture of *Myrrhe*, *Aloes*, and *Saffron*, drawn in the Spirits of wine and Sulphur.

Powder grossly, and mix together two ounces of good *Myrrhe*, the same of *Aloes Succotrina* and one ounce of good *Saffron*; put this mixture into a Bolt-head, and pour upon it Spirit of wine a fingers heighth above it; stop well the bolt-head, and let them digest two days, then open it, and add to it Spirit of sulphur, until the liquor is four fingers above the matter; shake it all well together, and having fitted another bolt-head to the former in order to make a Circulating vessel, set it in digestion

gestion in horse dung, or such like heat the space of four days. Then decant the liquor, and strain it, keep it in a bottle well stopd.

It is a very good remedy to fortifie the heart, it purifies the blood, and works by sweat, it is likewise good to help digestion, to bring down the *menfes*, and in hysterical vapours; the dose is from seven to twelve drops in some proper liquor.

Remarks.

The name *Elixir* has been given to many Infusions, or Tinctures of spirituous bodies prepared in spirituous *menstruum's*. They would express by this word a very pretious liquor, or a *Quintessence*. *Paracelsus* was the first who described this preparation. Many others since him have changed some circumstances relating to it, but all have tended to the same end, which is to draw forth the Tincture of those three ingredients.

I have used but one ounce of *Saffron*, because this little flower is very light, and takes up a great deal of room. Though we should use more of it, the *menstruum* would receive no more than it does, for there is as much in that quantity as is sufficient to fill the pores of the *menstruum*.

I do leave the ingredients to infuse two days in Spirit of wine all alone, that only their more sulphureous part may be drawn by this Spirit. The acid Spirit which is mixed afterwards, being sweetened by the ramous parts of the Spirit of wine has only force remaining to load itself with the Tincture. This mixture of Spirit of wine, and Spirit
of

of sulphur do give the Tincture a very pleasant smell, and they have some cordial quality besides. Wherefore I would not advise the changing this *menstruum*, as some do, by substituting in their place Spirit of Harts-horn.

If you would, you might draw more Tincture from that which remains in the bolt-head, but it will not be so strong nor so good as the first, because it has already parted with its more volatile parts.

C H A P. XVIII.

Of Tabaco.

T *Abaco* called *Nicotiana*, or *Petum*, is a Plant with broad Leaves, that grows abundantly in many places of *America*, as *Brazile*, and *Pern*, but the best that is brought into *France* is from *Florida*, it hath been transplanted among us, but our Countrey not being hot enough, that which grows here, is not so strong as the *Tabaco* that is brought out of *America*.

Tabaco, either chewed or smoked now and then, makes a great discharge of humors from the Head; but if it be used too immoderately, it is apt to cause several Diseases, such as the Palsie, and Apoplexy. It is beaten, and applied to tumors to discuss them, it being full of Spirits which do

rarifie them and open the pores. It is likewise infused in common water, and Tettars and other Itchings of the Skin are washed with this Infusion, but you must have a care that the water be not too much charged with it, for fear of giving a vomit.

Tabaco kills Serpents, Vipers, Lizards, and such like Animals, if you open a hole in their flesh, and thrust a little bit into it, or if you should smoke them with it.

Distillation of Tabaco.

Put into a Glass-Cucurbite eight ounces of good *Tabaco* cut small; pour upon it about an equal weight of *Phlegm of Vitriol*, cover the Cucurbite with its head, and digest the matter in sand for a day, fit to it a Receiver, and distil about five ounces of liquor in a small fire, keep it in a viol.

It is a powerful vomit, the dose is from two drachms to six in some proper liquor, it is likewise good for Tettars, and the Itch, being rubbed lightly with it.

Put that which remains in the Cucurbite into an earthen Retort, or Glassone luted, place it in a Furnace, and fit to it a great Receiver, and luting close the joints, begin with a small fire to raise all the phlegm; augment it by little and little, and the Spirits will come forth confusedly with a black Oil; continue the fire until there comes no more, then let the vessels cool, and unlute them; pour that which you find in the Receiver into a Tunnel lined with brown paper, the watry part will pass through, while the black and fetid Oil remains in the

the

the filter, keep it in a viol: a drachm of it may be mixed with two ounces of Hogs-grease, it is a good Remedy for the itch, and for Tettars.

An Alkali salt may be drawn from the Coals that remain in the Retort, after the same manner as the Salt of *Guaiaicum*. This salt is a Sudorifick, the dose is from four grains to ten in some convenient liquor.

Remarks.

Tabaco is full of such piercing sulphurs and volatile salts, that so soon as ever it is in the stomach, it falls a pricking the Fibers, and moving to vomit.

The *Oil of Tabaco* is so great a vomit, that if one should but hold ones Nose a little over the Viol, in which it is kept, it would make one vomit.

One day I made a small Incision in the skin of a dog's thigh, and thrusting in a little tent dipt in the *Oil of Tabaco*, the dog immediately purged both upwards and downwards with a great deal of violence.

The fixt salt of *Tabaco* may be made as I have said, but if you would have any quantity of it, you must join a great deal of other *Tabaco* with it, for receiving so little matter out of the Retort, it would be hard to get a drachm of Salt.

C H A P. XIX.

Extractum Panchymagogum.

THIS *Extract* is a *farrago* of the purer substances of divers purgative and cordial medicines.

Take an ounce and a half of the *Pulp* of *Coloquintida*, one ounce of the *Pulvis Diarrhodon Abbat*, so much good *Agarick*, and two ounces of black *Hellebore*, powder them all grossly, and put them into a matrafs: pour upon it rain-water distilled, four fingers above the mixture. Stop the matrafs close, and set it in digestion in hot sand, or in horse dung, three or four days, and shake the vessel ever now and then. After this pass your infusion through a cloth: pour upon the residue a like quantity of the same liquor; let it infuse as before, then strain and express it strongly; mix your infusions, and let them settle, until they become clear, decant them, and evaporate the liquor in an earthen pan in a sand-heat with a little fire, to the consistence of a Syrop: then mix with them half an ounce of Rosine of *Scammony*, and two ounces of *Extract* of *Aloes*, evaporate the whole to the consistence of an *Extract*.

It purges all the humors well, the dose is from one scruple to two in Pills.

Remarks.

Remarks.

The flesh or pulp of *Coloquintida* is nothing but the apple it self cleansed from its Seeds. It purges the Brain, the best is that which is whitest and lightest.

The powder *Diarrhodon Abbatis* is Cordial, and resists the malignity of humors, it takes its name from the *Rose*, which is its *Basis*.

The *Agarick* is a Resinous Mushroom, that grows on the *Larix*, the best is the whiter, lighter, and most friable; it is used for to purge the brain.

The root of *black Hellebore* is a very strong purger of Melancholy, wherefore it is given to Hypochondriacal persons, and even to the Maniacal; it gives a vomit, when taken alone, but with this mixture it fixes downwards; the white is a poison, taken inwardly; it is never used but for sneezing powders.

Scammony is a very Purgative resinous juyce, the best is most friable, and which being powdered hath a grey colour drawing towards white: its Rosine is drawn from it as that of Jalap.

Aloes is said to purge Choler, I have spoken of its virtues sufficiently already, when I described its *Extratt*.

Spirit of Wine is commonly used to make this *Extratt*, and it may seem to be so much the purer, being drawn by this dissolvent, rather than by a watry *Menstruum*; for spirit of wine dissolves only the more Balsamick and purer part of mixt bodies: but nevertheless I chuse rather to prefer the

use of Dew, or else Rain-water, nay and even common water before Spirit of wine for several reasons.

First, because in the evaporation of the liquidity of the *Extract*, drawn by Spirit of wine, a great many of the more subtile parts are lost, which this dissolvent had volatilized. And indeed it cannot be denied, but some useful parts will evaporate, let us use what dissolvent we please; but it is plain there is no such great loss, when watry *menstruums* are used, as when Spirit of wine. Now we should always prefer such *menstruums*, as are best able to preserve the virtue of the mixt, whose *Extract* we intend to draw.

The second is, because Spirit of wine does always leave some impression of heat and acrimony in the *Extracts* it draws, which the liquors that I use do not do.

The third is, because Spirit of wine is not so convenient a *menstruum* to dissolve the salts which the Ingredients we use are full of, and it is in this salt, that their greatest virtue does consist.

Wherefore we ought to chuse such dissolvents, as can best preserve the virtue of mixt bodies, and such as are familiar to our nature. We must use Spirit of wine to extract Rosines, such as that of *Scammony*, *Falap*, *Turbith*; but whenever an *Extract* can be drawn with a watry *menstruum*, it is better to use that, rather than another, for the reasons I have mentioned.

Purgative medecins have been divided into *Melanagogues*, *Phlegmagogues*, and *Cholagogues*. By *Melanagogues* are understood those that chiefly purge *Melancholy*, by *Phlegmagogues* such as purge

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Phlegm, and by *Cholagogues* those that evacuate *Choler*; so then by mixing these three sorts of Remedies, a composition is made that is called *Panchymagogue*, that is to say, purging all the humors, as doth the *Extract* I have described.

Now to explicate the action of Purgative Remedies upon all the several humors, you must consider in the first place, that Melancholy is a very Tartareous humor, and full of fixt salts; that *Phlegm* is very viscid, and descending from the brain sticks like Glue to the internal Membrane of the *Viscera*, and that *Choler* is very thin and easie to rarifie.

The Remedies which are called *Melanagogue*, such as *Scammony*, *Senna*, &c. are full of Lixivious Salts, which are very good dissolvents of the Melancholick humor contained in the lower parts, in that these sort of Remedies do always descend, and being strong purgers, do raise a Fermentation where-ever they come.

Phlegmagogues, such as *Agarick*, *Coloquintida*, &c. do purge the *Phlegm* chiefly that is contained in the Brain, because these Remedies are full of volatile parts which easily sublime thither by means of the Natural heat, and rarifying this humor do make it come down by the ordinary ways of Purgation.

Cholagogues, such as *Cassia*, *Rhubarb*, &c. which are mild Remedies, and are not strong enough to excite so great a fermentation as the others, do only purge *Choler*, it being very soluble, and easie to ferment; but they are not able to reach *Melancholy*, or *Phlegm*, by reason of their thickness; wherefore there is no need of wondring, why a greater evacuation of *Choler* than other humors is effected by these Remedies.

It

It is further observable, that the Remedies which purge *Phlegm* and *Melancholy*, do remain, or leave their impression in the body a longer time than those that purge *Choler*, because they more abound in Spirits or Salts: Moreover it is not to be imagined, that these *Phlegmagogues*, and *Melanagogues* do evacuate no *Choler* at all, for they do force away all they can meet with, but because it is then mixt with other humors, it appears not so plainly as when it is wrought upon alone.

CHAP. XX.

Of Turpentine.

There are two sorts of Trees that the *Turpentine* comes from, by Incisions that are made into them, to wit, the *Turpentine Tree*, and the *Larix*, or *Larch-tree*; there are a great many of both sorts in hot Countries, such as *Italy*, *Provence*, and even in *Dauphiné*.

Turpentine is properly a liquid Rosine in the consistence of a Balsom; that which is brought out of the Isle of *Chios* is best esteemed, and is also the dearest; that which we commonly use, and is called *Venice Turpentine*, must be clear, transparent, fragrant, and a little biting on the taste: it is used like a Balsom for Wounds, it is very Diuretick, taken inwardly, and is therefore given in

Gonor-

Gonorrheas, in *Bolus*, or else dissolved in some liquor by means of a little Yelk of an Egg, it gives the Urine a smell much like Violets. It is often boiled in water, and then becomes solid like Rosine, and being so prepared is made up into Pills, the Dose is from half a drachm to a drachm; if you take too much of it, it gives the Head-ach.

If in curiosity you should boil a little *Turpentine* in water for a quarter of an hour; and after you have removed it from the fire, if you should pour cold water upon it, you would see a little skin spread it self upon the water, which has many curious marble colours. And if you gather this skin into a lump, it will become a white *Turpentine*.

Distillation of Turpentine.

This Operation is a separation of the *Oil of Turpentine* from its terrestrious part.

Take three pounds of good *Turpentine*, and pour it into a Retort large enough to remain half empty. Add to it a handful of Stupe, to prevent the thicker parts of the *Turpentine* from rising when the liquor distils; you must cleanse the inside of the neck of the Retort, and place it in a Furnace to distil in an open fire; fit to it a Receiver, and luting the joints, begin the Distillation with a very small fire only to warm the Retort, and drive out a volatile spirit, after which augment the fire by degrees, there will come forth first a clear Oil, then a yellow oil, and at last a red oil; take care to separate these liquors as they do distil, and when
you

you see the red oil begin to come thick, take away the fire, and when the vessels are cold, unlute them. Keep all these liquors separately in Viols.

The volatile Spirit is an excellent Aperitive, it is given from four to twelve drops in some appropriate liquor, to expel Gravel out of the Reins or Ureters, in the Nephritick Colick, or to dissolve Viscosities, it is likewise used in *Gonorrheas*.

The first Oil serves for the same uses as the Spirit; the second and third do serve as a Balsom to consolidate wounds, discuss tumors, and to fortifie the Nerves.

Break the Retort, and you'l find in it a mass, melt and strain it to separate the Stupe; it is a good *Colophone*, and is used in Plaisters to dry and to consolidate.

After this manner may be distilled *Rosines*, *Mastic*, *Frankincense*, *Tacamabaca*, *Gum Elemi*, *Varnish*, *Labdanum*, and other *Gums* of this nature.

Remarks.

The *Spirit of Turpentine* is properly an *Ethereal* oil mixed with a little phlegm, and *Acid Essential* salt, which renders it *Aperitive*, it is this Spirit that gives the *Turpentine* its smell.

A great fire is requisite for to draw the last oil, and it becomes red, through some *Fuliginosities* that fall upon it, before it comes forth of the Retort.

If you should continue to raise the fire, until there comes no more liquor, you'd find in the Retort nothing but a little light, and very rarified matter that is good for nothing. The

The *Oil of Turpentine* that is bought at the Drug-gists, is a mixture of *Spirit*, and yellow oil.

The *Oil of Turpentine* being mixed with that of *Vitriol*, there grows a very considerable heat, and if the *Oil of Vitriol* is strong, it makes an ebullition. I have endeavoured to give you a reason for it in the *Remarks* which I have made upon Distillation of *Vitriol*.

C H A P. XXI.

Of Benjamin.

Benjamin called by some *Assa Dulcis*, is a Resine that distils from a great Tree in Foreign Countries, the name of it is unknown, though many have thought fit to call it *Laserpitium*; this Tree is very common in *Samaria*, and in many other adjacent Countries.

Benjamin is very much used by the Perfumers, and it hath use also in Physick, to resist the malignity of humors, and to fortifie the Heart and Brain; you must chuse it clean, friable, and full of white spots, and that sort is called *Amygdaloides*.

Flowers

Flowers of Benjamin, and its Oil.

This is an exaltation of the volatile salts of *Benjamin*, and a separation of its Oil, by distillation.

Take an earthen pot, high and narrow, with a little border round it, put into it three or four ounces of clean *Benjamin* grossly powdered; cover the pot with a Coffin of paper, and tye it round about under the border; set the pot into hot ashes, and when the *Benjamin* is heated, the *Flowers* will sublime; take off the Coffin every two hours, and fix another in its place; stop up quickly in a glass the *Flowers* you find in the Coffins, and when those which afterwards sublime do begin to appear Oily, take the pot off the fire; put that which remains into a little glass Retort, and fitting a Receiver to it, distil in a Sand-heat a thick and fragrant Oil until nothing more comes forth, there will remain in the Retort nothing but a very spongy earth.

The *Flowers* are good for Asthmatical persons, and to fortifie the stomach; the dose is from two grains to five in an Egg, or in Lozenges. The Oil is a Balsom for wounds and ulcers.

Remarks.

Benjamin being full of a great many volatile parts, easily sublimes over the smallest fire; the *Flowers* do rise in little needles that are very white; but if you give never so little fire more than,

than should be, they carry along with them a small quantity of Oil, which makes them to be yellow and impure. You must therefore perform the Operation in hot Ashes, or in Sand, to have the *Flowers* fair.

The *Flowers of Benjamin* have a very pleasant acidity.

Tincture of Benjamin.

Take three ounces of *Benjamin*, and half an ounce of *Storax*, powder them grossly, and put them into a bottle, or matrafs half empty, pour upon them a pint of Spirit of wine, stop your vessel close, and set it in warm horse-dung, leave it in digestion for a Fortnight, after which filtrate the liquor, and keep it in a Viol well stoppt: some do add to it five or six drops of Balsom of *Pern*, to give it a better smell: it is good to take away spots in the face, a drachm of it is put into four ounces of water, and it whitens like milk, this water serves for a wash, and is called *Virgin's Milk*.

Remarks.

This *Tincture* is a dissolution of the Rosine of *Benjamin* made in *Spirit of Wine*. When it is mixed in a great deal of water, it makes a Milk, because water weakens the *Spirit of Wine*, and makes it quit what it held up dissolved. If you let this Milk settle, the Rosine precipitates

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to the bottom of the vessel, and the water becomes clear.

The *Storax* is added to this *Tincture*, to encrease the goodness of the smell.

C H A P. XXII.

Of Camphire.

Camphire is a Rosine that distils drop by drop from a great Tree that is much like to a Walnut-tree in the Island *Borneo* in *Asia*. Little Cakes of it are likewise brought out of *China*, but that is not so good; it must be chosen white, transparent, clean, friable, without spot, and such as is hard to quench, when once lighted.

Camphire is compounded of a *Sulphur* and *Salt* so exceeding volatile, that it is very hard to keep it any time, and it always loses something, let it be never so closely stopt.

It is an excellent remedy for the Fits of the mother, it is not only smelt to by women in this condition, and used in their Clysters, but also taken inwardly; for it is lighted, and then quenched five or six times in some water proper to the Distemper, and so the water is given to drink; it is likewise good for intermittent Feavers, being hung about the neck, because in its evaporating away, it insensibly enters through the pores, and causes

causes a rarefaction, and transpiration of the humor which caused the disease: and for the same reason it is that several Druggs applied to the Wrists and other places, have often cured diseases: but you must observe that this sort of Remedies is always of a very Spirituous nature. *Camphire* is dissolved in *Spirit of Wine*, and this dissolution is called *Spirit of Wine Camphorized*, it is good in the Apoplexy, and in Hysterical maladies; it is also found to be of excellent use in the Tooth-ach, a little Cotton is dipt into it, and put into the aking Tooth.

Oil of Camphire.

This Operation is a *Camphire* impregnated with *Spirit of Niter*, which converts it into a liquor.

Powder grossly three or four ounces of good *Camphire*, put it into a matrafs, and pour upon it twice as much *Spirit of Niter*, stop your vessel close, and set it over a pot half full of water a little heated; stir it ever now and then, to help forward the dissolution which will be finished in two or three hours, and then you'll find the *Camphire* turned into a clear Oil which swims above the Spirit, separate it and keep it in a Viol well stopd.

It is used for the Caries of bones, and to touch Nerves that are uncovered, in wounds.

Remarks.

Remarks.

This Oil is nothing but a dissolution of *Camphire* in *Spirit of Niter*; for if you pour water upon it to destroy the force of the *Spirit*, it returns into *Camphire* as before.

Of all the Rosines this is the only one that can dissolve with *Spirit of Niter*.

This dissolution is made without Ebullition, or sensible heat, because the *Camphire* consisting of thin disunited parts, the acids do enter among them and make an easie separation: again acids mixing with sulphurs do never raise any ebullition, because they find those bodies too pliant and yielding, to make sufficient resistance.

If you have used three ounces of *Camphire* in this operation, you will obtain four ounces of Oil, and the *Spirit of Niter* will have lost an ounce; this last will likewise have lost much of its acrimony.

Some have censured this operation, by reason, say they, of the violent impression which the corrosive Spirit does give to the *Camphire* in its dissolution, and that therefore the acrimony of the medicine renders it of a dangerous use.

But seeing this Oil is not wont to be given inwardly, methinks there is very little reason for this scruple: there are medecins which are much more acrimonious than this, which nevertheless are not esteemed dangerous to be used. Again, there is occasion for this acrimony in the use that is made of this Oil, for the *Spirit of Niter* which is mixed with it

it does very much help the *Camphire* to deterge wounds, and to cleanse rotten bones:

C H A P. XXIII.

Of *Gumm Ammoniack*.

G*umm Ammoniack* is so called, because it distils from a sort of *Ferula*, or Fennil-gyant, that grows near the place where the *Oracle of Jupiter Ammon* stood heretofore; the best is in large yellowish tears, and white within.

It is given inwardly in Deopplivative Electuaries for Schirrhous Tumors of the Liver, Spleen, and Mesentery; it is used in Emollient and Attractive Plaisters.

The way to Purifie it is to dissolve it in Vinegar, then passing it through a cloth all the moisture is evaporated away over the fire; by this means it is cleansed from some straws or other little impurities that it contained. But some part of its Volatile Spirits are evaporated at the same time, and in them consists its greatest virtue, while some others are fixed by the acid, which always hinders the motion of Volatiles. Wherefore I would never advise this Purification to be made; I would rather, after chusing it as clean as may be, only powder it in a Mortar, to mix it with what may be thought fit; for though there should be some little

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straws

straws in it, that would never be able to alter the nature of the Remedy, or diminish its virtue so much as doth the destruction of its Volatile salts by the Vinegar.

The same thing may be considered in the use of all other *Gumms*; & if some of them, as *Galbanum* and *Opopanax*, are too moist to be powdered, you may cut them into little slices, & dry them in the Sun.

Distillation of Gumm Ammoniack.

This is a separation of the Oil and Spirit of *Gumm Ammoniack* from its earthy part.

Put a pound of *Gumm Ammoniack* into an earthen Retort, or glass one luted, great enough for two thirds to remain empty; place this Retort in a Reverberatory Furnace, and sitting to it a Receiver, begin the distillation with a very little fire to warm gently the Retort, and drive forth drop by drop a little Phlegmatick water. When the vapours begin to appear, throw out that which is in the Receiver, and refitting it, and luting close the joints, encrease the fire by degrees, and continue it until all is come forth. Then let the vessels cool, and unlute them; pour out that which is in the Receiver into a Tunnel lined with brown paper, the Spirit will pass through, and leave the thick black Oil in the filter, keep it in a Viol: it is good for the Palsie, and Hysterical diseases: the diseased parts are rub'd with it, and it is given to women to smell to.

Put the Spirit into a glass Alembick, and Rectifie it by distilling it in Sand. 'Tis a good Remedy against

against the Plague, and all sorts of malignant diseases; it is used in the Scurvy, and all manner of Obstructions, the dose is from eight to sixteen drops in some proper liquor.

The Spirit of all other *Gumms* may be drawn after the same manner.

Remarks.

Two thirds of the Retort must remain empty, because the *Gumm* rarifies exceedingly as it heats, and would be apt to come forth in substance, if it had not room enough. There is no need of adding alkali's for the Rectification of this Spirit, as many Authors would perswade us; this circumstance doth rather more hurt than good, because alkalies do spoil these sorts of Spirits, as I have said when I treated of the Rectification of the Spirit of Tartar.

The phlegm is taken out of the receiver before the Spirits come forth, in order to their being the purer. You will have six drachms of phlegm, three ounces and seven drachms of Spirit, six ounces of a black & stinking oil, and there remains in the retort four ounces six drachms of a black, light and very spongy matter, which is to be flung away. It is likewise a little inflammable by reason of fuliginosities which have fallen upon it. And this is that which gave it the black colour; a great deal of the ashes of this matter is requisite to make a little salt, for the salt of *Gumms* being commonly more volatile than fixed, it comes forth almost all of it in acid Spirit.

C H A P. XXIV.

Of Myrrhe.

Myrre is a Gummy juice that distils from a thorny Tree, of a middle height, by Incisions that are made into it; this Tree grows commonly in *Ethiopia*, and *Arabia*, and because the Inhabitants of those countries are thought to feed on Serpents, the *Myrrhe* that is brought thence is called *Troglodytick*. The Antients were wont to collect from the same Tree a liquor that fell from it without Incision, which was called *Stacten*; it is only a liquid Gum, but I am apt to think it should have more virtue than common *Myrrhe*, because it was the more spirituous part, which filtrated through the pores of the Bark of this Tree.

You must chuse such *Myrrhe* as is friable, light, odoriferous, clear, and such as is in small pieces, of a yellowish colour, and bitter to the taste; it is aperitive and discutient; it is much esteemed for obstructions of the *Uterus*, and to bring the *menstrua*, and to quicken womens Labour; it also resists malignity of humors, it is used in Corroborative remedies, and discutient Plaisters.

Tincture

Tincture of Myrrhe.

This Operation is a solution of the oily parts of *Myrrhe* in Spirit of wine.

Put what quantity you please of good *Myrrhe* powdered, into a Bolt-head, and pour upon it Spirit of wine four fingers high; stir the matter and set it in digestion in warm sand, two or three days, or until the Spirit of wine is loaded with the *Tincture of Myrrhe*; then separate the liquor by Inclination, and keep it in a Viol well stopd. It may be used to expedite womens Labour, to bring down the *menstrua*, and in the Palsie, Apoplexy, Lethargy, and all diseases that proceed from Corruption of humors; it is Sudorifick and Aperitive; the dose is from six drops to fifteen in some proper liquor; it is commonly used in outward applications, or mixed with the *Tincture of Aloes* to discuss cold Tumors, and to dissolve gypsous humors by way of Injection, and in the Gangrene.

After this manner may be made the *Tinctures of Castor and Saffron*, which are much esteemed in hysterical cases; the dose of them is from four to twelve drops in balm or mugwort water.

Remarks.

Though *Tinctures of Myrrhe* are daily drawn in wine, yet the best that can be prepared is with Spirit of wine, because this *menstruum* receives the more Oily, or Balsamick part of the *Myrrhe*;

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where

whereas the phlegm of wine does cause it to dissolve, and impregnate with the more terrestrious part of the *Gumm*, as well as with the Oily.

Some do use to evaporate this *Tincture* to the consistence of an Extract, but because thereby they are fain to lose the more volatile part of the *Myrrhe* with the Spirit of wine, I do conceive it better to use the *Tincture* it self as I have described it.

The *Tincture* of *Castor* makes the water white, into which you drop it, by reason of a *Rosine* which it contains, which is the same I have said, speaking of the *Rosine* of *Jalap*.

Oil of Myrrhe per Deliquium.

This preparation is a solution of the more separable parts of *Myrrhe*, made with whites of Eggs.

Boil Eggs until they are hard, then cutting them in two, separate the Yelk, and fill the White with *Myrrhe* powdered, set them on little sticks placed conveniently on purpose, in a plate, or earthen pan, in a Cellar, or some such moist place, and there will distil a liquor to the bottom of the vessel, which you may take out, and keep for use. This is called the *Oil of Myrrhe*: it is good to take away spots, and blemishes in the face, applied outwardly.

Remarks.

Remarks.

Though this liquor, improperly called Oil, is only the more soluble part of *Myrrhe* humected with the moisture of whites of Eggs, and the Cel- lar together, yet it is the best of any that have been invented, whether you should draw it in Spirit of wine, or distill this Gumm in a Retort ; for by Spirit of wine the more volatile part of *Myrrhe* is lost, either by Distillation, or Evaporation ; and it is so torrifed in a Retort, that it loses its best virtues ; whereas *per Deliquium* what volatile this Gumm contains is preserved in its natural be- ing, for the wet that mixes with it is no ways capable of destroying or altering its nature.

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CHAP. I.

Of the Viper.

Passing by the fabulous Stories that the Ancients have left us concerning the Birth of the *Viper*, I shall say it is a sort of Serpent, that comes into the world by eating through the belly of her Dam, and killing her; whence she is called *Vipera, quod vi pariat.*

This *Animal* is very common in *Dauphiné*, and *Poitou*, from whence it is carried all over *France*. While it is in the field it feeds upon several little *Animals*, but when taken and shut up in any place, it may be kept a whole Summer without eating any thing at all, provided it hath Air enough to breath in.

The reason why they can live so long without eating is doubtless that the pores of their skin being so exceeding narrow, as they do appear to be upon examination, very few of their Spirits do
come

come to be lost ; wherefore they have little need of successive nourishment to beget new ones, as other animals have, who spend abundance of Spirits.

'Tis good to take *Vipers* in the Spring, or Autumn, because then they are fattest, and in greatest vigour. The Cold kills 'em. They differ from other Serpents in that they never grow so much ; they have two Teeth on the sides of their Jaws, and those very long, in comparison with a great many little ones that are round about, and the Gum of each of those long Teeth is full of a Yellowish Juice, in which many do think their venom consists ; now Serpents have none of those long Teeth, but only little ones.

Again, they differ in that being taken up by the Tails, they can't wind themselves like Serpents, to make such circumvolutions about the Arm, or thing that holds them, and this by reason of the different connexion of their *Vertebra's*.

When the *Viper* is irritated, it shoots out a forked tongue, which looks like a little fire-brand, by reason of the vigorous motion of its Spirits ; those who never had seen the teeth of the *Viper* do think this is that which causes all the mischief, but the tongue is not at all venomous. Some do save the tongue, to wear about their neck instead of an Amulet, in order to preserve them from the effects of ill airs. Serpents do likewise thrust out their tongues as the *Viper* does. But here it may be good to advertise you by the by, that those things which are brought to us from *Malta* for the tongues of petrified Serpents are nothing but the teeth of a fish which that Countrey affords.

The

The biting of *Vipers* is more dangerous than that of other Serpents, but the most quick and assured Remedy that can be used upon it, is to crush the head of the *Animal*, and lay it on the wound, because by opening of the pores it lets out the venomous Spirits that were got in. The bit person may likewise take the volatile salt of *Vipers*, as I shall shew hereafter.

It is not yet sufficiently known wherein consists the venom of *Vipers*, nor can any good substantial reason be given of the accidents which happen after the biting. Most men think this malignity consists in the enraged spirits. And this is the opinion of *Van Helmont*, and *Poterius*, according to the relation of *Zwelfer* in his Remarks upon the *Augustan Dispensatory*, where he treats of the *Troches of Vipers*: He saith there have been a great many eminent men who have confirmed this opinion with curious observations, on the bitings of enraged *Animals*, particularly of Man, of the Cat, Wolf, Horse, Dog, Weasel, &c. And among others *Fabritius Hildanus* in his Chirurgical Operations, to whose proofs he thinks nothing further can be added to confirm the truth of this opinion: If accidents, saith he, do happen that are sometimes more severe, and sometimes less, they must be attributed only to more or less provocation and anger, or sometimes to a more profound or slighter biting of these *Animals*. This opinion seems likewise to have been confirmed by some experiments, which Monsieur *Charas* relates in his book of *Vipers*, where he shews not only that the enraged Spirits are the sole poison of the *Viper*, but also pretends that the *Yellow Juice* which
is

is found in the hollow part of the Jaw, wherein the great tooth is fastned, and was supposed to be the venom of this *Animal*, is no such matter; for having poured some of this liquor on the wounds of several beasts, not one of them died, nay further, that those persons who had ventured to taste it, never found any inconvenience from it. Nevertheless Monsieur *Redy* in a particular Treatise on the *Viper* will not grant the truth of these experiments.

On the contrary he maintains, that having put some of this *Yellow juice* into the wounds of divers sorts of *Animals*, they soon died upon it, and thence concludes that the venom of *Vipers* consists in the *Yellow juice*, and not in the enraged Spirits only, as the others have thought, he taking this cause alone to be too Metaphysical.

And in truth who would believe that the *Idea* which this *Animal* forms, when he finds himself provoked, should be able to imprint on the Spirits qualities so malignant?

Now in so great an opposition of Opinions and Experiments, a certain great man of these times found a way to reconcile them, by affirming that the *Yellow juice* of *Vipers* did produce different effects, according to the several places where these *Animals* lived; so that Monsieur *Redy* might have found the *Yellow juice* to be venomous in *Italy*, whereas in *France*, where the Climate is not so hot, this *juice* doth not produce any poisonous quality, unless it be quickned by the *Angry Spirits* of the *Viper*, which gives it a sufficient penetration.

Others do confidently assure us they have seen several *Animals* in *France* die, soon after they had

had put some of this *Yellow liquor* into the wounds they had made for that purpose, which very much favours the assertion of Monsieur *Redy*.

Furthermore as for what is related, that in *France* people have ventured to taste this *Yellow liquor* without any harm, I find this not to be a convincing proof that it is no poison; for although *Spirit of Vitriol*, for example, or some other acid, does not prove mortal, when taken inwardly, nevertheless if the same quantity should be syringed into the veins, the Animal falls presently into Convulsions, and dies. Now as that which caused the *Spirit of Vitriol* taken inwardly not to be Poison was this; the acids do become weak through the mixture of the *Saliva*, and before ever they come to mix in the Mass of blood, their parts do receive so great an alteration from the ferment of the places they must pass through, that they are able to do nothing else at most but cool the Body: so the same may be said of the *Yellow liquor* of the *Viper*, when it is tasted of, that besides its mixture with the liquors of the mouth and stomach, it receives divers alterations from the ferments of the places it must pass through, before it enters into the mass of blood.

Many do likewise think that the venom of *Vipers* hath its chief seat in the *Gall*, and thence is easily transported to the Gums, when they are angry; nevertheless in the Anatomy of this *Animal* there's no passage found capable of such a translation. I know very well that the pores of living bodies may be said to be so open, that all manner of liquors may be presumed to pass through them, but yet no mischievous effect is discovered to proceed

ceed from the *Viper's Gall* when given inwardly, for it only causes sweat.

Lastly, others will have the *Viper's* venom to be dispersed over all its body. And those who think thus, do advise us to whip these *Animals* in a warm bason to drive their venom into the extremities of the body, before we cut (as is usually done) their *heads* two fingers below, and their *tails* two fingers above; after that, to flea off the skin, and take out the bowels, and then boil the body in water, wherein are added Salt, and Dill, to correct, as they say, the remaining malignity. When the flesh is tender, it is to be separated from the bones, then to eight ounces of this flesh beaten into a Paste in a marble mortar are added two ounces of bread dried and powdered, and *Troches* made of it, which being dried are kept for use.

But this long preparation is seldom used, since Experience hath taught us, that no part of a dead *Viper* is at all poisonous. The *Head* and *Tail* dried and powdered may be taken instead of a Cordial, as well as the rest of the body. I can likewise assure you, upon my own experience, that the Tooth of a dead *Viper* is no ways venomous, having by chance been prickt my self till the blood came, whilst I was a handling the heads of *Vipers* newly kill'd that I had a mind to dry, and there did not follow the least ill accident from it.

Furthermore by this Coddion the *Vipers* flesh is deprived of its volatile salts, which gave its greatest virtue; for they dissolve in the broth, which is flung away, and only the *Faces* remain, wherein there hardly rests so much Cordial virtue as there does in the bread which is mixed for a Corrective.

But

But there is no need I should enlarge my self further on this subject, because these *Observations* are sufficiently delivered in the *Augustan Pharmacopœia*.

Wherefore I do conceive it to be much better to use the *Powder of Vipers* newly made, than the *Troches*.

To make this *Powder* well, it is good to chuse *Vipers*, when they are in the prime of their strength; the Females that are full of Eggs or young ones, are not so good as the others: their heads are to be cut off, their *skins* thrown by, and their *bowels* taken out, and so they are set a drying in the shade, to be afterwards powdered in a mortar.

But because this *Powder* is hard to keep, in that worms do breed in it, it will be good to make it into a Paste with a sufficient quantity of the mucilage of *Gum Tragacanth*, so form it into *Troches*, to dry them, and powder them when there is occasion to use them, and thus it keeps good a long time.

This *Powder* is given in the Small pox, Malignant Feavers, and all other maladies where *Alexipharmicks* are required, and the humors are to be purified by Perspiration; the dose is from eight grains to thirty in broth, or some other convenient liquor.

The *Heart* and *Liver* are dried in the Sun, and powdered together, and this *Powder* called *Animal Bezoar*, hath the same virtues as the body of the *Viper*, only it is given in a little lesser dose.

The *Gall of Vipers* provokes Sweat; the dose is a drop or two in *Carduus* water.

The

The *fat* that is found in them is melted, then strained for to separate it from the membranes it sticks to, it is as clear as Oil. Several Countries do use it in the Small-pox, and in Feavers: The dose is from one drop to six in broth, or some other convenient liquor. It likewise enters into the composition of some Plaisters, and into discutient unguents.

Distillation of Vipers.

This Operation is a separation of the phlegm, the volatile salt, and the Oil of *Vipers* from its earth.

Take twelve dozen of *Vipers* dried in the shade, as I said before, put them into an earthen Retort, or glass one Coated, place it in a Reverberatory furnace, fit to it a great capacious Receiver, and luting the joints close, begin the distillation with a small fire to warm the Retort gently, and drive out a phlegmatick water drop by drop; when you see no more drops to fall, encrease the fire a little, and *Spirits* will come forth, which will fill the Receiver with white Clouds, you will see at last a black oil come, and the volatile salt stick to the sides of the Receiver. Continue the fire until there comes no more, after which let the vessels cool, and unlute them. Shake about the Receiver a little, to loosen the volatile salt from the sides, and pour it all into a Bolt-head, fit to it a head and a small Receiver, and lute the joints with a wet bladder; you must set your vessel in Sand, and with a gentle fire under it, the volatile salt will sublime, and stick

to the head, and uppermost part of the bolt-head; separate it and keep it in a viol well stopd.

It is one of the best medicins we have in Physick, it is good in Malignant Feavers, and Agues, the Pox, Apoplexy, Epilepsie, Palsie, Hysterical Maladies, and the bitings of all venomous Beasts; the dose is from six to sixteen grains in some proper Liquor.

Pour that which remains in the bolt-head into a Tunnel lined with brown paper, the Spirit and phlegm will pass through, and the stinking Oil remain behind; Hysterical women may smell to this last, to allay vapours, and Paralytical parts may be anointed therewith; but its smell is so offensive that it is hard to endure it.

Pour the Spirit and Phlegm mixed confusedly together into an Alembick, and distil in a vaporous Bath about half the liquor, you'll have a Spirit that must be kept well stopd, it hath the same virtues as the Salt; the dose is from ten to thirty drops.

The Phlegm must be flung away:

If that which remains in the Retort is Calcined in an open fire, and a *Lixivium* made of it, as I said concerning fixt Alkali Salts, a small quantity of fixt Salt will remain, which nevertheless hath no more virtue than other Alkali Salts I spoke of before.

The volatile salts of Harts-horn, the blood, Skull, Nails, Hair, and other parts of Animals may be drawn after the same manner.

Remarks.

The Receiver must be sure to be large enough, that the Spirits may circulate with greater ease, the fire must likewise be well managed; for these Spirits being forced out too fast do rush forth violently, and break the Receiver, or else are lost through the joints.

The Phlegm comes before the other Principles in the first distillation, but in the Rectification the Volatile Salt rises first, because it is at liberty, and is lighter than the Phlegm.

The Spirit which is drawn from Animals by Chymistry is nothing but a volatile salt dissolved in Phlegm.

Your vessel for sublimation must be very high, that the Volatile Salt may rise without any Phlegm, for when the vessel is short, the Phlegm riseth with the Volatile salt, liquifies it, and turns it into Spirit. A bolt-head, or a long body with its head, may serve for this Operation, because the Phlegm being too heavy cannot mount so high, and therefore leaves the Volatile Salt to sublime alone, which may nevertheless be Rectified to become more pure; you must mix it with the distilled Spirit, and repeat the Sublimation according as I have said: but because this Salt always carries along with it a small quantity of Oil, a few days afterwards it loses its whiteness, and turns Yellowish: now to avoid that, you must pour upon it, when it is in the bottle, *Spirit of Wine Tartarised* one fingers height, and so keep it well stopp'd. This

This *Spirit of Wine* hinders the salt from dissolving its self and the Oil it contained, so that after some days it turns red, and the salt grows white; when it is to be used, the *Spirit* is decanted from it, and the Salt left alone: by means of this Lotion it loses a little of its former smell; but care must be taken that the *Spirit of Wine* be well Rectified, for if there remained any the least Phlegm, the Salt would dissolve in it. You may also sublime it again as before, after having well washed it in *Spirit of Wine*, it will be dry, and very fair.

There is another way of Rectifying the Volatile salt, which is by mixing it with four or five times as much bones, or horns burnt white, and putting the mixture into a glass, or earthen body, then fitting to it a blind-head, or such a one whose Nose has not been opened, after that luting well the joints, then setting the vessel in sand, and with a gentle fire the Volatile salt will rise, and stick to the head, you must continue the fire until there rises no more.

This salt is hereby purified from a great deal of its Oil, which remains in the powder of Bones, wherefore it becomes whiter than it was, and pleasanter to the palate. It may again be mixed with other Calcined bones, and sublimed as before, to render it purer still, and take away more of its loathsome smell, that's caused partly by the *Empyreumatical oyl* that it draws along with it in the distillation.

The Volatile salt dissolved in a little water Crystallizes like Sugar-Candy, and then it is easier to keep than before.

There can be drawn from *Animals* but a very little quantity of fixt salt, because the Spirits which abound in them do volatilize their salt: for which reason this volatile salt keeps dry longer than that of *Vegetables*.

The virtue of *Animals* doth principally consist in their Volatile salt, it is that which gives meat its savour, that makes Broths strong, and turns them into a Gelly, according as they do abound more or less. The *Fuscula Consummata* which are made with a small fire are better than those that are boiled quick, because a strong fire carries away good part of the Volatile salts.

Volatile Salts do rarifie the humors of the body, both by reason of their piercing nature, and also in that being Alkalis they do dull the strength of Acids, which keep the humors condensed, after which the blood being in greater motion than before, doth the more easily purifie it self, either by perspiration or by Urine, from heterogeneous bodies which were there gathered together.

This Operation may serve to shew how the Volatile Salt of all *Animals*, or any part of them, may be drawn. When the Volatile Salt of Blood is to be drawn, that of the best colour must be taken and dried in the Sun, or else with a very little fire, and so distilled like *Vipers*.

If you distil two and thirty ounces of shavings of *Harts-horn*, you'll draw thirteen ounces of liquor, and Volatile salt, and there will remain in the Retort nineteen ounces of matter as black as Coal.

You'll draw from the liquor an ounce and a half of Volatile salt, six ounces of Spirit, and two ounces of Black oil.

The

The black matter being grinded on a Marble is good for *Painters* use; if you Calcine it, the fuliginous parts which make it black, will fly away, and leave the *Harts-horn* very white; you'll have sixteen ounces of it, and this is called *burnt Harts-horn*. It is accounted a Cordial, but indeed has no other virtue than to destroy acids, as all other alkali matters do.

Some do *fix* *Harts-horn* with *Bricks*, and Calcining it that way, they call it *Harts-horn* prepared *Philosophically*, they account it more Cordial than it was before; but they are egregiously mistaken, for the Volatile salt, and oil, which were the things that should render it *Cardiacal*, were carried away in the *Calcination*, and there remains only a *Terrestrious* matter that may be called a *Caput mortuum*. Notwithstanding it is an alkali, which may serve as *Crabs-eyes*, *Coral*, and divers other matters of the like nature, which absorb acids; the *Bricks* bestow no virtue at all to it.

If you distil forty ounces of *Ivory*, you will draw thirteen ounces of liquor, and volatile salt; and there will remain in the Retort six and twenty ounces of a matter as black as Coal.

Afterwards by the Rectification you will get two ounces and a drachm of Volatile salt, one ounce and five drachms of a stinking black oil, five ounces of Spirit, and four ounces two drachms of phlegm.

If you Calcine the black pieces which remain in the Retort, in an open fire, the foot will leave them and they will burn white; this is called burnt Ivory, or *Spodium*: it has the same virtues as *burnt Harts-horn*, you will have at least twenty ounces of it.

It is here remarkable that *Ivory* does contain much more earth than *Harts-horn*, and doubtless that is the reason why it is the whiter.

If you distil twelve ounces of *Hair*, you will obtain eight ounces of liquor and volatile salt. There will remain in the Retort three ounces and a half of a black matter very spongy and earthy, from which no fixed salt can be drawn.

And by Rectification you will raise into the Head an ounce and seven drachms of a very fine volatile salt; separate by a filter three ounces of a black and very fetid oil, and by distillation of that which is filtrated you'll have two ounces of Spirit, and nine drachms of phlegm.

All Volatile salts have much resemblance in their figure, smell and taste, but that of *Vipers* is accounted the most active, and proper against Poisons; those of *Harts-horn*, and *Mans Skull* are thought to be better than others for the Epilepsie, that of *mans blood* to purifie the blood, and so of the rest.

When you Rectifie the Spirit of *Vipers*, or *man's Skull*, or *Harts-horn*, or *hair*, in order to purifie them from their phlegm, if you should let the liquor continue distilling longer than is fitting, the phlegm will rise after the Spirit, but then it separates from the Spirit as water separates from oil, the Spirit will be uppermost, and a little troubled, and whitish, but if you keep these two liquors together for a month, the whole will mix together, and there will be no longer any separation of them at all.

These effects do happen from this, that the Spirit in rising does carry with it some small quantity

tity of Oil, which was dissolved in the liquor by reason of salts that it contains. This Oil is very volatile, it rises with the Spirit, and by rendring the Spirit a little oily, it hinders at first the phlegm from mixing with it. It is likewise this little quantity of oil which makes the Spirit look a little troubled, and whitish; but when the Spirit and phlegm are kept a good while together, they mix, and the whole appears like a homogeneous liquor, because there being but little oil in the Spirit, the phlegm insensibly enters into, and incorporates with it; wherefore you must take care to separate the Spirit from the phlegm so soon as ever you take the Receiver from the nose of the head, in case you have suffered the liquor to distil too long.

What I have now spoken of does not happen in the Rectification of the Spirit of *Ivory*, and without doubt the reason is that the *Ivory* does not contain so much Oil as the other parts of *Animals*.

Some do prepare a *Sudorifick water* with *Vipers* after this manner.

They do put the *Vipers* alive into a great earthen body, they fit to it a head with its Receiver, they lute the joints, and distil in a *Balneum* all that will rise from it; but you must take care that the head be well fastned to the body, for when the *Vipers* begin to be heated, they leap and sling about with so much violence, that they would otherwise throw it down, and get out of their stove. And then the Artist must have a care of himself, and not be too bold, for these creatures being irritated would sling about on every side, and a bite of theirs at that time would be twice as dangerous as at another.

This water which rises whilest the *Vipers* are in their greatest fury is Sudorifick, because some Volatile salts have risen and mixed with it. You may give of it from a drachm to half an ounce in some proper liquor.

But to avoid the forementioned danger you might cut the *Vipers* in pieces before you put them into the body; and because these pieces of them do retain life a long time, the water will be little the worse for their not being intire.

When you have drawn as much water from them as you can, by the heat of a *Balneum*, you must put the remainder of the *Vipers* into a Retort, and distil it as I have shewn before; you will thereby have the *Volatile salt*, the *Spirit*, and the *Oyl*.

CH A P. II.

Distillation of Urine, and its Volatile Salt.

THIS Operation is a separation of the *Spirit*, the *Volatile Salt*, and the *Oil of Urine*, from the phlegm, and the earth which it contains.

Take ten or twelve quarts of *Urine* newly made by sound young men, evaporate it in an earthen or glass Cucurbite in a Sand-heat, until it remains in the consistence of Honey; then fit a head with its

its Receiver, and luting the junctures close, continue a small fire to distil the rest of the phlegm, after which encrease it by little and little, and the Spirits will rise in Clouds, carrying with them a little Oil, and after that the *Volatile salt*, which will stick to the head like Butter-flies; continue the fire until there comes no more; then unlute the Vessels, and separating the *Volatile salt*, put it into a bolt-head, pour likewise into it the Spirit that is in the Receiver, and fit a blind-head to the bolt-head; lute the junctures with a wet bladder, and setting your bolt-head in Sand, sublime with a small fire all the *Volatile salt*, as I have shewed concerning that of *Vipers*; separate this Salt, and keep it in a Viol well stoppt. It is a good Remedy for Quartan Agues, and Malignant Feavers, it opens all Obstructions, and works both by *Urine* and Sweat: the dose is from six to sixteen grains in some convenient liquor; filtrate that which remains in the bolt-head, the Spirit will pass through the Filter, whilst a small quantity of black and extraordinary stinking Oil remains, which is good to discuss cold Tumors, and to give to Hysterical women to smell to.

You may distil the Spirit in a Sand-heat to separate it from a thick matter that remains at bottom, it hath the same virtues as the Salt; it is given from eight to twenty drops in some proper vehicle.

Two drachms of it are mixed with two ounces of *Spirit of Wine* to rub Paralytical parts with; it is likewise used for cold pains, and for the *Sciatica*.

If the Mafs that remains in the Cucurbite should be Calcined and a *Lixivium* made of it with water, a very small quantity of fixt Alkali salt might be gotten from evaporating the water, and it hath the same virtues as other Alkali salts.

Remarks.

The *Urine* of young men is to be prefer'd before others, because it contains more Salt. It must be newly made, and evaporated with a gentle fire, that the Fermentation, or too much heat, may not cause the *Volatile Salts* to rise with the phlegm. The *Spirit* is only a *Volatile salt* dissolved in a little phlegm; this *Volatile salt* works more by *Urine* than any of the rest, but its smell is more offensive.

This Remedy must never be given in Broth, for Broth being to be taken hot, the heat evaporates some of the *volatile salts*, before it can well be taken.

A *Volatile salt* may be drawn from *Urine*, after setting it some months Fermenting in a Vessel close stoppt, and then a third part of the Liquor must be distilled with a gentle fire; it is in this *distilled Urine*, that the *Volatile salt* will be found exalted by the Fermentation. Rectifie this liquor again three or four times, throwing away each Distillation the *Phlegm* that remains at the bottom of the Cucurbite; then putting your *Spirit of Urine* into a Matrass with its head, sublime the *Volatile Salt* as I shewed before. Some do add to it *Salt-peter*.

This *Salt* is of a more penetrating nature than the other, but a great deal of time is required to make it.

The

The Phosphorus.

It is a luminous matter distilled from *Urine* that has been fermented.

Take a good quantity of humane urine, let it ferment, or putrifie in the air in an open vessel three or four months: then pour it into earthen pans, and evaporate it over the fire, until the remaining matter comes to the consistence of thick honey, put this matter into an earthen body that can endure the fire, and is big enough to be left at least half empty, place your body in a furnace, fit to it a glass head with its receiver, and having well luted the joints, give it a little fire for two or three hours to distil some phlegmatick Spirits which still remained in the matter, after which you must encrease the fire by little and little to the third degree, there will rise some small quantity of *Volatile Salt*, which will stick to the head, and some black oil which will fall into the receiver, continue a good coal fire, until there comes no more Oil; let the vessels cool, and having taken off the receiver, pour the liquor you find in it into a Tunnel lined with brown paper, the Spirit and phlegm will pass through, and the oil will remain in the filter, put the oil into an earthen pan, and in a mild sand-heat dry it until it comes to be as thick as an ointment: take off the head, and you will find in the body a black spongy mass which you are to separate from the solid compact matter which remains at bottom, powder your spongy matter, and mix it with the dried black oil;

oyl; put it into an earthen retort, set it in a Reverberatory furnace, fit to it a large capacious receiver, and luting well the joints, give it a small fire to heat insensibly the Retort, then increase it by little and little, a *Volatile salt* will come forth which will stick to the sides of the receiver, and a little oil with it, increase the fire to the last degree of violence, and you will perceive a white Fume, which after it has circulated in the receiver will likewise stick to the receiver, and will be of a yellow colour; this is the *PHOSPHORUS*, continue the fire in its greatest vigour four or five hours, or until no more will come into the retort.

Let the vessels grow cold, then unlute them, throw water into the receiver, and having shook it sufficiently about to loosen that which was glu'd to its sides, pour it all into a large glass vessel, and leave it to settle, the volatile salt will dissolve in the water, but the matter of the *Phosphorus*, and the oil will precipitate to the bottom; decant the water, and having gathered the matter together, put it into a little glass vessel, add to it a little water, and place the vessel in sand, give it a digestive heat, and stir the matter gently with a wooden spatule, the *Phosphorus* will separate from the oil, and sink to the bottom, you may make it up into little sticks whilst it is hot, by putting of it into the neck of a very little bolt-head, and taking it out when it is cold, then keep it stop'd in a little bottle filled with water, for without water to preserve it, it would spend it self and be lost in fumes.

To

To make the *PHOSPHORUS liquid*, you must scrape or break off a piece of it, put it into a viol, and pour upon it the clear *Essence of Cloves* to the height of one finger, stop the viol close, and set it two days in digestion in horse-dung, stirring it from time to time, to help the solution of the matter, after that take your viol and keep it, you have in it the *liquid PHOSPHORUS*. All the matter will not have dissolved, some part of it will remain at bottom.

Remarks.

The word *Phosphorus*, comes from the Greek, $\phi\acute{o}\sigma\phi\omicron\rho\varsigma$, that is, *Lucifer*, or the Morning-Star.

Of them there are the Natural, and the Artificial, the Natural are such as Glow-worms, Rotten wood, and many others. The Artificial are made with the *Bolonian stone*, with chalk, with urine, with bloud, and with divers other sulphureous matters.

The *Bolonian stone* was one of the first Artificial *Phosphorus* that has been known: it takes its name from the Town in *Italy* where it was made, he that did prepare it is dead without leaving the knowledge of his Secret, insomuch that no body 'till the present has been able sufficiently to imitate it, he did calcine it for a certain time, and perhaps after such a manner as we are still ignorant of, then exposing it to the air it yielded a great light in the dark, which by little and little grew weaker and weaker. This *Stone* is bituminous, and full of Sulphur, which is the thing that gives

gives it this disposition to shine in the dark, but because its sulphur is spent by little and little, it comes at length to be opaque, like another stone. When it has not been calcined enough, it yields no light at all, because the sulphureous parts have not been put into sufficient motion, and when it is calcined too much, these sulphureous parts are thereby lost; therefore a *medium* is to be observed, which no body has yet been able to hit.

The *Germans* being very curious and industrious in Chymical concerns, have found out several kinds of *Phosphorus*, and I do not doubt but upon working further upon this subject much may still be done. Among those who have particularly applied themselves to it *Balduinus* a German has invented a sort of *Phosphorus*, whose description I shall give anon; *Kunkelius* a Saxon has written very well upon it, and workt to good effect; *Daniel Kraff* a German Chymist is the first inventor of the *Phosphorus* which is drawn from Urine, he gives it the consistence of a paste, or of a liquor, as he pleases; and the Honourable Mr. *Boyle* of London, to whom all the ingenious have so much obligation, put forth a Treatise in *English* about three or four years ago, called *Noctiluca Aeria*, full of abundance of Experiments, and most Curious Remarks which he has made upon this *Phosphorus*; he likewise found the way to give it a solid consistence, and a little while since he put forth the same Treatise in *Latin* enlarged above half with new Experiments and Observations on the same subject.

You must provide a great quantity of Urine for this Operation, for a great deal is necessary to draw

a little luminous matter from. The vessel in which it is put to ferment is left open, that the air entering into it may help the fermentation; and in truth, the more volatile salts are hereby lost, but yet there do remain sufficient to make the *Phosphorus*. When the Urine upon evaporation begins to grow thick, you must take care that the matter does not swell over the vessel, for it rarifies very much; you must evaporate as much phlegm as possibly you can when the evaporation is made in the earthen pans to the end that the operation be sooner ended in the body, for there is much less time spent in the evaporation, and it is much more easie to keep down the matter when it swells in earthen pans, than in a body which is luted, and has its head on. The body must therefore be sure to be large enough by reason of this rarefaction of the matter, which will be apt otherwise to rise into the head, and to mix in the receiver with the distilled liquor, which would force you to begin the distillation anew.

When the vessels are unluted, you may take the Volatile salt out of the head, if there remains any in it, and rectifie it as I have shewed speaking of the distillation of Urine, but you will find little of it, because the greatest part of this salt was lost in the fermentation; you might also preserve the liquor which is separated from the oil in the filtration, it is a Spirit of Urine.

The compact matter which remains in the body after that the spongy part is separated, is fixed and saline; you might calcine it, and draw from it a fixed Salt of Urine by a *Lixivium*, as other fixed alkali salts are separated.

You

You must heat the Retort very gently, for if you should make too great a fire at first, it would break it to pieces.

The Oil which is separated from the *Phosphorus* at the end of the operation is a little luminous, but it is very fœtid; there is but little of it because some part of it has been rarefied by the fire, and turned into *Phosphorus*.

Mr. Boyle gives a description of the *Phosphorus*, in which he puts to the thickned Urine three times as much sand.

The *Phosphorus* contains more sulphur than any thing else, for water condenses it, and oyls dissolve it; it has an offensive smell, and it is partly to correct the smell that it is dissolved in Oil of Cloves, when we make it liquid.

The liquid *Phosphorus* gives more light at first than the solid, because its matter is more rarefied. Open but the bottle in the dark, and it appears to be all of a fire. You might use Oil of Cinnamon instead of Oil of Cloves, and the light would be still the greater, because the parts of Essence of Cinnamon are more volatile than those of the Essence of Cloves, but it would endure the less time for the same reason. Add to this, that the Oil of Cinnamon is a very dear commodity.

If you should fire a little piece of the solid *Phosphorus* with a Burning-glass, and quench it when two thirds of the quantity are consumed, that which remains will be yellow, and a little luminous still; it will easily dissolve in water. This Experiment shews, that the more fixed part of the *Phosphorus* is saline, because it dissolves in water.

The

The *Phosphorus* is luminous in the dark at all times, but especially in hot weather; for the cold does a little constringe the parts. If you take a little piece of the Solid, or even the stopple of the bottle that contains the liquid, and write with it on paper, or upon the hand of a person, the letters do seem to be a perfect fire.

If you rub a little piece of the solid *Phosphorus* on paper; and press it down with the point of a knife, the paper will be set on fire.

After some Experiments made one day at my house upon the *Phosphorus*, a little piece of it being left negligently upon the Table in my Chamber, the maid making the bed took it up in the bed-clothes she had put upon the Table, not seeing the little piece: the person who lay afterwards in the bed; waking at night, perhaps through the more than ordinary heat he felt, perceived that the coverlid was on fire. It seems the *Phosphorus* being heated with the body of him that lay in bed had set fire to the coverlid, and had before he perceived it burnt a great hole in it.

It is observable, that the air lighting the fire by exciting the motion of parts in the *Phosphorus*, does likewise make it yield a considerable light; for when the matter has continued shut some time in the glass, it shines no longer, and it recovers its light no more until the glass is opened, and the air is let into it.

Nevertheless some Experiments made a while since in *Paris*, at the house of Monsieur d'Alence, by Mr. *Homburg* a German, do seem to evince the contrary, that the air is not always necessary to make the *Phosphorus* shine in the dark.

M m

The

The case was thus: a very little piece of the solid *Phosphorus* was put into a little glass bottle; a brass cock was fitted to this bottle, and made so as it could enter into another cock belonging to a large glass Receiver. Then the bottle that contained the *Phosphorus* was heated, and the cock of this bottle was made to enter into that of the great glass vessel, out of which the air had been pumped. So soon as the cocks were opened, the air came forth of the little bottle, and at the same time was seen to come a great train of light like a flash; nay some did discover particles of the *Phosphorus* at the bottom of the great glass.

The bottle was then taken from the receiver, and the light of the *Phosphorus* was very much diminished: it sometimes seemed to be quite out, the cock was turned to let in the air, and presently the *Phosphorus* recovered its light again.

In the mean time the heat of the *Phosphorus* grew less and less, and it yielded but a weak light. We began the Experiment again, the same bottle that had the *Phosphorus* was applied to the great glass receiver, and when the air was drawn out of the bottle, the *Phosphorus* did shine brighter; on the contrary when we let the air again into it, the *Phosphorus* went out: which is quite different from what hapned whilst the bottle that held the *Phosphorus* was hot in the former Experiment.

We repeated the Experiments divers times, and saw the same thing continually happen: that is to say, the *Phosphorus* being heated lost much of its light, when the air was pumped out of the bottle wherein it was contained, and it recovered light again when new air was let into it: on the contrary the

the *Phosphorus* being cold did shine when the air was pumped out of the bottle, and the light disappeared when the air was let into it.

It suffices to have related two Experiments, as contrary one to another as can be, it is easie to judge what would happen when the *Phosphorus* is not so hot as in the first Experiment, and when it is not altogether so cold as in the second, the alteration of the least circumstance quite alters the Experiment, but the same things always happens in proportion with those already described.

We made another Experiment thus: we put a little piece of the solid *Phosphorus* into a crystal vessel, and we poured upon it a very fixt acid liquor, I think it was *Oil of Vitriol*, a great fume arose from the mixture; we stopt the bottle with paper, and stirred the matter several times after having left it some hours in digestion. We lookt upon it in the dark, and it appeared luminous, though it were stopt, and it has still been alike luminous from about two months ago until the present. Indeed the light of it is not so great as is that of the *Phosphorus*, but it keeps a much longer time.

That which is surprizing in these Experiments is, that the air does sometimes make the *Phosphorus* shine, and sometimes not. Now to explicate this difficulty, I do say, that in the first Experiment the greatest part of the luminous matter of the *Phosphorus* did fly out of the bottle into the receiver, and that that which remained in the bottle after it was separated from the receiver, being deprived of its most subtle sulphurs, was not able to give so great a light as before; nevertheless the

matter still retaining a little warmth, there did rise from it enough particles to give a light when the bottle was unstopt, but because by the cold the little bodies do condense, and lose very much of their motion, this *Phosphorus* likewise loses much of its strength, and gives but a languid or weak light.

When the air was drawn out of the bottle, the matter lookt very light, and when the air was let to it again, it went out, the reason whereof is that the light being weak, could not preserve its self but with a convenient proportion of air, and there was some remaining still in the bottle, for though the air be never so much pumped out of the vessel there will still remain a little behind. The *Phosphorus* loses its light by the usual great quantity of air, as a little candle will be put out by being exposed to the wide air, or a small fire will soon go out, when too great a wind blows strongly upon it. So long as the *Phosphorus* sends forth a great many vapours, a good deal of air is requisite to make it appear luminous, and a little air will not be sufficient. Wherefore when the *Phosphorus* was hot, it would not shine, until the bottle was unstopt, but when it was cold, it sent forth only weak vapors, wherefore then a very little air sufficed to make it shine, and when it received too much, it was thereby suffocated.

The last Experiment made in the little Crystal bottle does further very well prove my explication: the fixt acid liquor which was poured upon the *Phosphorus*, did slacken the motion of its parts, so that from that time they could not display their light with so much vigour as they did; wherefore

fore a very little sufficed to continue its light, so that the paper-stopple served to give it sufficient air; but when the bottle was stop't closely with its Crystal stopple, no more light was seen for some time afterwards, because that stopple did wholly hinder the entrance of air. It is likewise the fixing of the Volatile parts of the *Phosphorus*, which preserves the light so long, for the matter having now less motion than before it was fixed, its parts do come to be dissipated with the more ease.

But you will tell me, that the great fume which exhaled from it when the acid liquor was poured upon the *Phosphorus*, is rather a sign of a greater than less dissipation of parts.

I grant that when this acid acts upon the matter, there is at that time a considerable exaltation of parts, but I say also that when this great motion is once over, that which remains is in much less agitation than it was, and you must observe that the strong acids, such as *Oil of Vitriol*, and *Spirit of Niter* upon being mixed with *Spirit of Wine* do cause a much like fume as this, and yet afterwards the *Spirit of Wine* is much less volatile than it was.

Again the light of the *Phosphorus* which is in the little crystal bottle that is stop't, may be said to be partly caused by an air which is produced by a kind of fermentation, for doubtless there is some little action between the acid and the matter.

I find therefore that there is a parity of reason in the explication of the light which appeared in the viol after the air was pumped out of it, and that which is seen in the little crystal bottle stop'd.

It is further remarkable that this same *Phosphorus* which went quite out, when air was let into it by means of the Pneumatick Engine, yet did not altogether lose its light when it received the air the common way, that is to say, meerly by unstopping the bottle, whereof the reason is this, the air that is communicated from the Air-pump comes in with a great force and violence through the pipe, and so may very well put out the light of the *Phosphorus*, which the air that has its ordinary motion is not able to do; after the same manner as a candle lighted is much sooner put out when exposed to a blast of wind, than when it is set in a place where the air is quiet.

From considering all the kinds of *Phosphorus*, both Natural and Artificial, and the Experiments that have been made upon them, I cannot but conclude, that the general cause of the light they give does proceed from a very great agitation of insensible parts; and whereas it is very probable that fire is only a very violent motion of little bodies round their center, the parts of our *Phosphorus* may be said to have received the same determination by the fermentations it has undergone; for *Wood* never shines in the dark until it is become rotten, that is to say, until it has undergone a sufficient fermentation to make its most subtile parts move nimbly round their center. The *Bolonian stone* is not luminous until it has been calcined a certain time, in order to excite a motion of its parts.

The *Viper* being irritated darts forth its tongue with so much quickness, that it appears all on fire. Many little creatures, such as some kinds of *Caterpillars*, and *Woodlice* do shine in the night, because

cause they have a matter so exceeding subtiler towards their tail, that it produces a sort of fire; and it is for the same reason of the motion of parts that *Urine* does become luminous.

That which gave occasion to the working upon *Urine* for the making of the *Phosphorus* was, that in some little holes of the earth wherein there had been standing-puddles of *Urine*, a light had been observed to be seen at nights.

But you will ask me then, why the greatest part of mixt bodies do yield no light, although the same means are used to excite a motion of their parts.

I answer, that all mixt bodies have not their insensible parts so disposed to a rapid motion, and after such a manner as those I have now spoken of. Wood indeed will easily enough flame, but you can't make a flame with stones, because you cannot give stones the same determination to motion of parts, as you can to wood. To give light, or to make a fire, bodies must be compounded of sulphureous parts, for sulphurs are very susceptible of motion.

I do not at all doubt but an infinite number of things, that there is no imagination of at present, might serve to the making of *Phosphorus*, when inquisitive men shall have a mind to try it.

It has been observ'd in many men, that when they have been in a great rage, or are become extream Cholerick, the very hair of their head has shone brighter than usual; and we need not be scrupulous in believing what is said of *Alexander the Great*, that when he was hotly engaged in the battle, fire was seen to sparkle out of his eyes,

because his humors were then in an extraordinary commotion.

What I have now said may pass for a general explication on this matter, but if we should descend into particulars nicely, it would be very hard to clear so well as could be wished a great many doubts that have been raised: for example, *wherein* consists the difference of fermentations, which of many like matters makes this to shine, and that not to shine, although they do seem to have undergone the same fermentations and elaborations in a like space of time. *Why* some things that have fermented but little do give a light, and others of the same nature, though they have fermented as long and longer, yet give no light. *Why* one side of a matter shall be luminous, and the other shall not be; we ought to have a very perfect knowledge of the structure and the order of the insensible parts of the matter, to give good substantial reasons for the resolution of these doubts.

Sometimes there have been found in the Shambles pieces of Veal, Mutton, Beef, which do shine in the dark, though they have been but newly killed, and yet other pieces of the same kind killed at the same time, shall not shine at all. Nay, this very year was seen at *Orleans*, in a very temperate season, a great quantity of meat of this sort, some of it would shine all over, and others of it would shine only in some certain places, in form of Stars. It was likewise observed that with some Butchers almost all their meat was found to be luminous, and with other Butchers there was not a bit to be seen of that kind. Men concluded presently

presently that such flesh as this was altogether unwholsome to eat of, they therefore flung away a great deal of it into the river, and several Butchers there had like to be ruined by this accident; but at last perceiving that there was such quantities of it, some people ventured to eat of it, and at length it was found to be as good meat as any other.

I conceive that this *Phenomenon* may be imputed to two causes.

First to the Pasturage of the beasts; for it is certain that in some countries the herbs are more spirituous than in others, and those do give such an active impression to the humors of those beasts who feed on them, that they may have a disposition to the making this *Phosphorus*.

Secondly, To these beasts having been heated more than others in their driving upon the road, or else to their having been killed before they had sufficiently rested after their journey; for the spirits being put into a great motion thereby, do not every where lose it after the beast is killed, and so long as the spirits do continue their rapid motion, so long the *Phosphorus* is to be seen, but when the flesh begins to stink, there appears no more light in it, because these vigorous spirits are then spent, or else they come to be confused in the meat by the means of another fermentation.

But you will not fail to make me this Objection: If the *Phosphorus* does consist in a violent motion of the insensible parts, then stinking meat should be more luminous than that which was newly killed, because the smell proceeds from the separation of the principles of a mixt body by fermentation, which as they rise from it do strike the nerve

nerve of Smelling, wherefore there must needs be a greater motion of parts in stinking meat than in that which is fresh.

I answer that that which makes the *Phosphorum* in meat newly killed is a matter much more active and more subtile than that which gives the ill smell to stinking meat; it is a remainder of the spirits which do run with a prodigious swiftness through the body of a living creature in all its parts, and unless the matter be in this degree of motion, it will never become lucid, no more than if the insensible parts of inflammable matters be not put into a very rapid motion, they will not take fire.

Perhaps also it may be that the meat in the corrupting might receive a sufficient agitation of parts to produce light, as it happens sometimes in the standing puddles of Urine.

In considering the light which appears upon the surface of standing Urines, I have been led to think that there are oftentimes serosities that settle in the bodies of sick persons which might be in a condition to make kinds of *Phosphorum*, if they had but air enough to illuminate them; at least they do produce the effects of fire, as in Gouts, in Rheumatisms, in the *Erysipelas*, and in abundance of other Inflammations.

The Hermetick PHOSPHORUS of BALDUINUS.

It is a mixture of Chalk, and the Acid Spirits of *Aqua fortis*, which makes it lucid.

Make

Make red-hot about two pounds of Chalk, then let it cool, and powder it.

Take a quantity of *Aqua fortis*, for example a pound, pour it into a great glass body, and throw into it a spoonful of your calcined Chalk powdered, it will make a strong ebullition; when that shall be dissolved, throw into it as much more, and continue to do so until it makes no ebullition; let the liquor settle, and decant it into an earthen pan placed in sand, and evaporate all the liquor with a little fire, you will have remain a kind of salt at bottom.

Put this salt into a Coppel, or into an earthen pan unglazed, set it in sand in a gentle heat, the matter being heated will swell, continue this gentle heat about an hour, or until it be a little sunk, cover it then with a cover or lid that has three or four holes in it, increase the fire by little and little, until it be strong enough to melt the matter, and when it is melted you must expect to see a yellow vapour come forth through the holes of the lid: so soon as that appears you must take your vessel off the fire, and having covered it with an earthen lid without holes instead of that with holes, suffer it to cool.

You will find on the sides of your vessel a border of yellow matter, which is sometimes to the thickness of a finger, this is the *Phosphorus*, take it and keep it in a box well stopt in some dark place.

When you would have it appear lucid in the dark, you must expose it about a quarter of an hour to the light, without which it will not shine in the dark.

Remarks.

Remarks.

Chalk is a bituminous earth called in Latin *Cre-ta*, from the Isle of *Crete*, where there is abundance of it. It likewise abounds in many other Countries. Some Authors do recount three sorts of it, the white, the greenish, and the black, but that which we use in this operation is the common, the white: It is calcined in order to make its *Sulphur* more active than it was before; the more volatile part of it flies away, but there is still enough remaining to make the *PHOSPHORUS*.

Although *Chalk* be bituminous, nevertheless it is an alkali, because the *Sulphurs* which it contains in small quantity are not capable to shut the pores of it; and besides, the calcination opens them more, and disposes this earth to receive more easily the impression of acids, which plainly shews it self by the strong ebullition that happens when it is thrown into the *Aqua fortis*. The body must be large, and the *Chalk* must be thrown into it by little and little, to hinder the matter from boiling over. The *Chalk* does all of it dissolve perfectly in the *Aqua fortis*; and more is still to be added, until there be no further ebullition; for that is the sign that the acid spirits have rarefied the matter as much as they were able, and that being as it were sheathed or locked up in the matter, they could not possibly dissolve any more of it; if therefore you should still add more in superfluity, the overplus would precipitate to the bottom. When the *Aqua fortis* you use is good, it dissolves

dissolves very near its weight in Chalk; the solution of it is yellow.

That which is evaporated is the more phlegmatick part of *Aqua fortis*, and the acid Spirits being incorporated with the Chalk do make a kind of austere salt; this salt might very easily be dissolved into a liquor in the air. It is fit that it should be very dry, when it is put into the Coppel, that the operation may be done the sooner; the vessel is covered, that the matter may be the more easily melted, but the cover must needs have holes in it, to give vent to the vapours which rise from it, and that we may see when the vapours do come yellow, that we may then immediately take the vessel off the fire, for these yellow vapours are they that make the *Phosphorus* lucid.

After Calcination you find at bottom of the pan, or coppel, a terrestrious matter which must be flung away as useless.

In order to preserve this *Phosphorus* the better you may leave it as it is in the vessel wherein it was Calcined, but you must stop it close in a box with a glasse lid.

It is to be kept in a shady place, that its parts being thereby the more condensed, they may spend the more slowly; and when you would have it to shine in the dark, you must expose it to the air about a quarter of an hour, because the air does put its parts into a motion. This *Phosphorus* is in its effects very like to the *Bolonian stone*, but that takes the air much sooner than this *stone*, because it contains abundantly more salt; its light does not endure so long as that of the *Phosphorus* which I described before.

CHAP.

C H A P. III.

Of Honey.

Honey is compounded of the most Balsamick substance of several Flowers, which the Bees do separate and carry into their Hives for nourishment. They do gather up and order this Honey most artificially, as if they took special care to make provision against Winter, and thereby they make way for the Fermentation which sends to the sides the grosser part which is like to a *Tartar*, and called *Wax*, the Honey being found in the middle; the best to the taste is the White, but for Physick the Yellow is the better, as containing more *Spirits* than the other; it must be of a moderate consistence, that is to say, neither too hard, nor too clear.

A *Hydromel* is prepared with it for Diseases of the Breast.

A *Vinous Hydromel* is made of water and clarified Honey, then the liquor is put to Ferment in a vessel in the Sun, until it is grown as strong as *Spanish wine*; a Spirit may be drawn from it; and *Hydromel* will grow as fowr as wine.

Distilla-

Distillation of Honey.

This preparation is a separation of the Water, the Spirit, and the Oil of *Honey* from its terrestrial part.

Put four pounds of good *Honey* into a large earthen body, and distil the water in a moderate Sand-heat, until acid drops begin to come; then take away the fire, and keep this Water in a bottle; it is good to make the hair grow, you must either wet your Comb with it every day, or else dip a piece of Sponge into it, and therewith soak the roots of the hair.

Take that which remains in the Body, put it into an earthen Retort, or glass one Coated, but one that's large enough for two thirds to remain empty, and place your Retort in a Reverberatory Furnace; then fitting a large Receiver, and luting the joints, begin the distillation with a small fire for three hours only to warm the Retort; then encrease it by little and little, Spirits will come forth with a little black Oil, and fill the Receiver with Clouds; continue the fire until all is come out that will, unlute the vessels, and separate the Spirit from the black and stinking Oil in a Tunnel lined with brown paper, (there is but very little Oil) keep them both in Viols: you will have twelve ounces of *Spirit*.

The *Spirit* is an excellent Aperitive, some of it may be dropt into Juleps, to give them an agreeable acidity.

The

The *Spirit* may be Rectified by distilling it in Sand in a glass Body, and that which rises last may be kept apart as the strongest of all; it is used for to cleanse old Ulcers, and to eat proud flesh.

The *Oil* is good to be used in *caries* of bones.

You will have in the retort six and twenty ounces of a black very spongy matter, which is inflammable by reason of a foot that remains in it; when it is burnt it yields but very few ashes, out of which nothing can be drawn.

Remarks.

The Vessels must be exceeding large for the *Distillation of Honey*, because a great vacuity is requisite for it to rarify in.

The *Water of Honey* makes the Hair to grow, because it opens the Pores; some do mix it with the Juice of *Onion* to render it the more effectual.

Sometimes a little *Wax* is found in the receiver, which came with the *Spirit* from the *Honey* in the distillation.

Distillation of Wax.

Melt two pounds of *Yellow Wax* in an earthen pan, and mix with it three or four pounds of potters earth powdered, or so much as is requisite to make a Paste of it, form it into little pellets, and put them into an earthen Retort, or glass one Coated, a third of which remains empty; place this Retort in a Reverberatory Furnace; fit to it a Receiver, and luting the joints, give a small fire at first, and there will come forth *Phlegm*, then a *Spirit*; encrease the fire a little, and a liquor will distil that congeals in the Receiver like *Butter*; continue the fire till nothing more comes forth; then unlute the joints, separate the *Spirit* mixed with *Phlegm* from the *Butter*, and keep it in a Viol well stoppt. It is a good opener; the dose is from ten drops to twenty in *raddish* water, or some other appropriate liquor.

Some do use the *Butter of Wax* to discuss tumors, rather than the *Oil* that I am going to describe.

Melt the *Butter of Wax* in an earthen pan, and make a paste of it with sufficient quantity of pot-
ters-earth powdered; form this paste into little
pellets, put them into a glass retort, set your re-
N n retort

tort in a Sand-heat, fit to it a Receiver, and luting the joints, begin the distillation with a small fire, a great many *Spirits* will come forth mixed with *Phlegm*, after which encrease it a little, and a clear yellow *Oil* will come; having distil'd about three ounces of it, change the Receiver, for that which comes at last is as thick as *Butter*. It may be Rectified with other clay, or potters-earth, and it will change into as transparent an *Oil* as the other. Separate the *Oil* from the *Spirit*, and keep it in a *Viol.* It is a good discutient for Tumors, and Cold pains: it is mixed in Unguents and Oils for that purpose.

The *Oil of Wax* may be rectified several other times to make it still clearer than before.

Remarks.

The solid consistence of *Wax* doth proceed from a proportionate mixture of *Water*, *Volatile Salt*, and *Oil*, united and incorporated together; wherefore its solidity comes to be destroyed, according as the *Principles* do suffer a separation; and this is easily observed in the *Rectifications*, for in every distillation that is made, some considerable quantity of water is separated, and the *Oil* does likewise become clearer.

The *Clay* serves only to separate the parts of *Wax*, and to rarifie it the more.

If by way of curiosity you desire to know exactly what quantity of liquor, or Spirit, can be drawn from *Wax*, you must dry your *Clay* as much as you can; or else use in its place, broken pots,

pots, or Bricks powdered, which are not at all wet: out of three and twenty ounces of *Wax*, you'll draw in the first distillation just the same weight of liquor; to wit, twelve ounces of *Phlegmatick Spirit*, and the rest is a *Butter*; in the second and third distillation you'll draw fourteen ounces of Spirit, and six ounces of clear Oil.

Spirit of Wax is only a small quantity of acid Volatile salt dissolved in Phlegm; but you must not believe what some have written, that having distilled a considerable quantity of *Wax*, and put that which was drawn into a Bolt-head, they could sublime the Volatile salt like others of that nature. For this salt, though it be indeed Volatile, yet it is not Volatile enough to rise before the *Phlegm*; it is an acid salt much like unto that of *Ambar*, but is not of the nature of Volatile alkali's, which are known to sublime so easily; it were better therefore to keep this Spirit as it is, or else to evaporate about half of it with a very mild heat, that it may be the stronger.

The Volatile salts of many sulphureous matters are drawn acid, as they are in the mixt, because being clothed with soft and ramous parts which give way easily to their motion, they do not break their natural keenness by endeavouring to separate, when they are forced to it by fire, and so they do not receive so much terrestrious and fiery matter, as is requisite to make them porous, like Volatile alkali's.

This Operation, and that of the Distillation of *Ambar* which I have described, do much confirm what I said before in my *Remarks* upon the *Principle*, that all the salt of mixt bodies is naturally

acid, and that alkali is nothing else but an alteration of the Natural Salt, made by fire. Besides, all sorts of Experiments do seem to me to confirm and establish this opinion; but yet I am not so peremptory in the vindication of it, but that I would gladly give place to another, if I could be shewed that it is better than mine, for I seek after nothing so much as to discover truth.

FINIS.

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